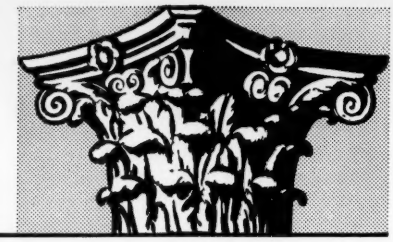
PACIFIC DISCOVERY

50 CENTS

CALIFORNIA ACADEMY OF SCIENCES

March-April 1954

VOLUME VII • NUMBER 2



"My responsibility—and my pleasure.."

No right-minded man neglects his family's welfare. As circumstances change, he reviews his estate plan, and keeps close to his attorney's advice in revising his Will to fit into new laws, new tax procedures and new conditions within his own family circle.

He makes it a point, too, to understand and consider the advantages he gains by naming a bank as executor of his estate.

That is his responsibility—and his pleasure!

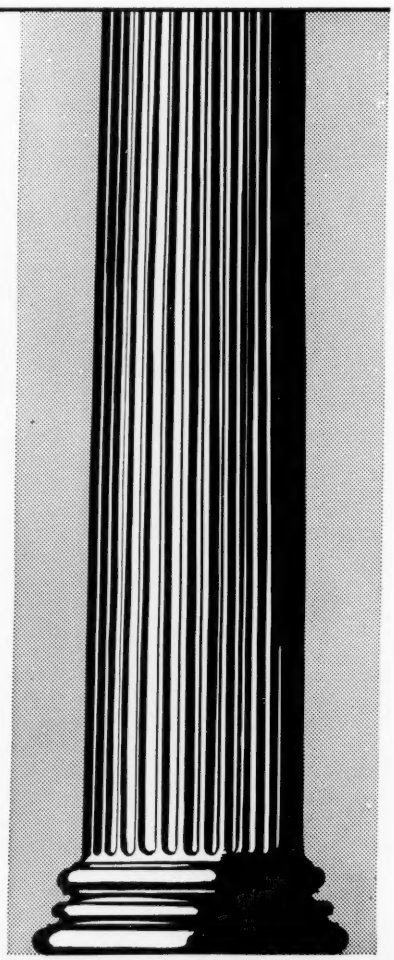
SAN FRANCISCO
Head Office: 400 California Street
Mission Branch: 3060 16th Street

THE BANK OF CALIFORNIA

NATIONAL ASSOCIATION
Incorporated in 1864

SAN FRANCISCO · PORTLAND · SEATTLE · TACOMA

Member Federal Deposit Insurance Corporation



A JOURNAL OF NATURE AND MAN **PACIFIC DISCOVERY** IN THE PACIFIC WORLD

Editor and Art Director: DON GREAME KELLEY • *Managing Editor:* ROBERT C. MILLER
Associate Editors: A. STARKER LEOPOLD *(University of California)* • IRA L. WIGGINS *(Stanford University)*
BENJAMIN DRAPER, ROBERT T. ORR, EDWARD S. ROSS, VERONICA J. SEXTON *(California Academy of Sciences)*
Special Correspondents: RUTH E. HOPSON *(Oregon)* • THANE RINEY *(Wellington, New Zealand)*
Advertising and Circulation Manager: RUEL R. CROCKER, JR.

Vol. VII · No. 2
March-April
1954

PRE-DISCOVERY

IN HIS BOOK *Adam in Ochre* (reviewed in this issue) Colin Simpson reports an incident of the Smithsonian Institution – National Geographic Society – Commonwealth of Australia Expedition to Arnhem Land, 1948. Smithsonian's Curator of Anthropology, Dr. Frank M. Setzler, came into camp with a haversack full of rocks from the top of a hill, where he'd been digging. Author: " 'What sort of a day have you had, Frank?' Behind his glasses his eyes were bright in a face dirtier than a chimney-sweep's. 'I've had a bonzer day, as you'd say. Today I really hit a jack-pot!' . . . He was happier than a sandboy. 'Look at this,' he said, seizing the haversack, spreading its contents on a camp table, and diving onto a red quartzite scraper, attached to which was a piece of half-rotted wood. 'See!' He held out this big chip of red rock, which I could see was edge-worn from use, and pointed to the handle into which the rock was hafted by a gob of ironwood gum. 'Yes,' I said, failing to share his excitement. 'What's it mean?' 'It means we know now how they used those damned scrapers we've been finding. They hafted them and used them as a sort of little hatchet. This is one where the haft hasn't rotted all away. Don't you see – nobody has ever found one hafted before!'

"You have to be a scientist. You have to know what parts are missing from the jigsaw you are trying to build into a complete picture of how people lived, what they did and how they did it. You find a bit of the jigsaw that no one had found before. It fits in, and the picture is so much nearer being complete. Setzler could not resist bringing his treasure down to the mess-tent at dinner time. . . . For Frank it had been a bonzer day."

There is another point to the story. What a bonzer day it will be on earth when diplomats shall work together in the spirit of scientists, finding the pieces and putting together the jigsaw of a well ordered world! – when, in mutual respect and understanding they shall share each other's enthusiasm for the common goal – when, nationalism aside, they'll take on the big ones as world problems, to be solved for the whole world's good. Every broad-gauge scientist works his special field from the world standpoint. International coöperation in science has long been taken for granted. The spontaneous delight in discovery is a language understood the world over.

DISCOVERING PD'S AUTHORS

CHAIRMAN of the University of California Department of Paleontology, **Dr. R. A. Stirton** is one of many who have come back from down under full of warm praise for the friendliness and good will of Australians. Of all scientists, Americans these days have the greatest command of the means to roam the earth in search of the missing parts to whatever picture they are working on. Perhaps they can be, if they will, our best ambassadors because international boundaries have no meaning in their work. . . . ¶ Our own Academy Curator of Herpetology, **Joseph R. Slevin,** also knows the hospitality of Australian sheep stations. In his search for such reptiles as "Stumpy-tail," he has traveled from one to another, always in response to an urgent invitation. At one station he would sometimes meet the owner of another, perhaps farther outback, who would insist on taking him along on the return home. . . . ¶ We welcome our outstanding contributor of bird photographs, **Don Bleitz** of Hollywood and Los Angeles, back to *PD.* Since his work last appeared he has married, toured Europe, and set up the Bleitz Wildlife Foundation in Los Angeles, for the study, appreciation, and protection of our wildlife. We have asked for and he has promised an account of the conservation work he and Mrs. Bleitz are doing. . . . ¶ It was a pleasure to have **Barbara and Don Ollis** drop in to our office not long ago on a visit to San Francisco from their home in Santa Barbara. Don had been working around Saipan with Dr. Bruce Halstead, as photographer on a Navy sponsored expedition to collect material and data for Dr. Halstead's important study of ichthyosarcotoxism, a jawbreaker for the mysterious poisoning from certain fishes. More of this later. . . . ¶ Morrison Planetarium lecturer **Leon E. Salanave** looks at the Sirius side of the sky for Spring, and also the *light* side of the Zodiac. D.G.K.

COPYRIGHT 1954 BY CALIFORNIA ACADEMY OF SCIENCES

IN THIS ISSUE

Digging Down Under
R. A. STIRTON 2

Australian Double-Header
JOSEPH R. SLEVIN 13

Some Birds of the Desert Spring. Photographs by
DON BLEITZ 14

Fishing in Panama Waters
BARBARA & DON OLLIS 20

ASTRONOMY:

Spring Sky: The Brightest Star and the Zodiac's Strange Light
LEON E. SALANAVE 26

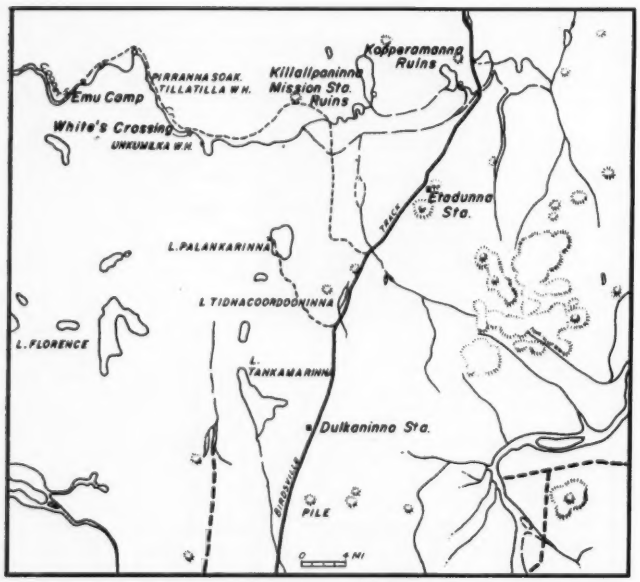
REVIEWS 29

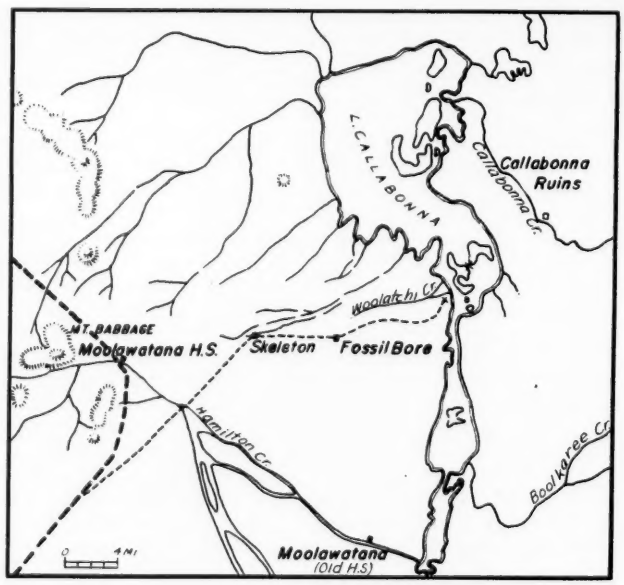
THE COVER COPY

PRAIRIE FALCON – his story and the details of the photograph by Don Bleitz will be found on page 14, along with five more desert birds in a special feature.

PACIFIC DISCOVERY is published bimonthly at Gillick Press by the California Academy of Sciences. Publication office: 2057 Center Street, Berkeley 4. Editorial and Advertising offices: Golden Gate Park, San Francisco 18. Subscriptions: $3 per year; single copies: 50c. Members of the Academy subscribe through their dues. Entered as second-class matter, February 17, 1948, at the Post Office, Berkeley 4, California, under the act of August 24, 1912.

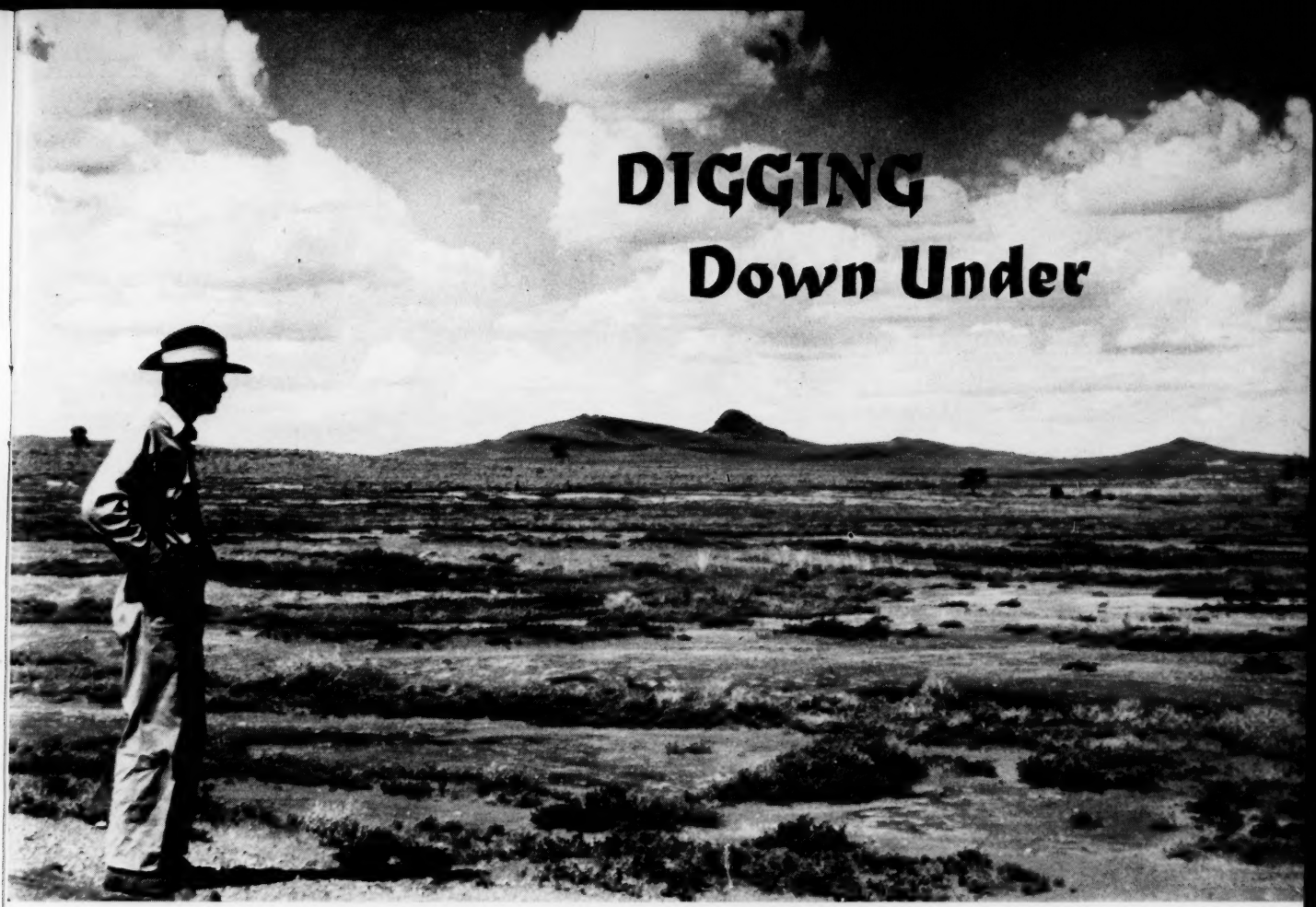
MAPS: Australia, showing the area and routes of the three expeditions of 1953. *(Below) right:* Detail of the *Diprotodon* trip to Lake Callabonna. *Left:* Detail of the Cooper's Creek and Palankarinna trip. (Maps drawn by Owen J. Poe, Museum of Paleontology, University of California.)





Californians and Australians search together for the animals and men of Australia's ancient past

DIGGING Down Under



Richard H. Tedford, California paleontologist, surveys Australia's arid heart, near Broken Hill. (Stirton)

R. A. STIRTON

A PALEONTOLOGIST is concerned with the origin and succession of life on earth. Any part of the globe is likely to attract his attention as he searches for the fossil remains of animals and plants in sedimentary rocks where most of those that have been preserved have lain for millions of years. With fossils as evidence, and aided by studying the sediments in which they occur, he can reconstruct the environments of the past because he does not visualize these animals and plants of the past as dead. In his mind's eye he sees them as they must have been in their time and place on earth, much as we see living things today. He is also interested in the progressive changes in the different groups of organisms through time – evolution, and in their movement and distribution over the earth. He might be able, for instance, to trace the dispersal of families of organisms from the Steppes of Russia to the Great Plains of North America, or from a marine embayment in Colombia to one in North Africa.

Though we still have much to learn about the fossil record on each continent, it has been worked out fairly well – except in Australia. There the greatest gap is in the mammals, where something like 125 million years of their record is essentially unknown. Many fossil remains have been uncovered in cave and river deposits of the Pleistocene epoch (going back a million years) on that continent. Perhaps two dozen of these creatures have been described, but their relationships have not been adequately understood. These few have actually thrown very little light on the long tenure of mammals on the gigantic island down under.

One partial skeleton of a bush-tail-like possum *(Wynyardia)* was discovered many years ago at Table Cape, northern Tasmania. This animal evidently belonged to the early Miocene fauna (35

Chert hill breaking down to form gibbers. (Lawson)

Tedford (left), Paul H. Lawson, truck, Land Rover, trailer. (Stirton)

million years ago) of that region. This, then, offered us virtually the only information on the long history of the early ancestors of these primitive mammals, the marsupials (pouched mammals), and nothing is known of the progenitors of the monotremes (egg-laying mammals), though both groups are still living in Australia, Tasmania, and New Guinea.

Australia has been a large continental mass for a long time. It was only reasonable to assume that somewhere under the brown gibber plains* and drifting sands of the interior, the badlands of continental deposits (river, lake, and floodplain formations) would yield the remains of fossil mammals. Thus I had dreamed for 20 years of some day going there to try my luck at opening the door to a new field of research and to unravel a history of life that scientists have speculated upon for a century.

Consequently in 1953 Mr. Richard H. Tedford (graduate student, University of California) and I went to Australia, as Fulbright Scholars, to tackle this most fascinating problem, and also to see if we might discover a sequence of Tertiary continental faunas such as other continents have yielded. This was to be a coöperative project of the South Australian Museum, the Department of Geology of the University of Adelaide, and the University of California Museum of Paleontology. Also, a grant-in-aid given by the Associates in Tropical Biogeography, University of California, made the Menindee trip possible.

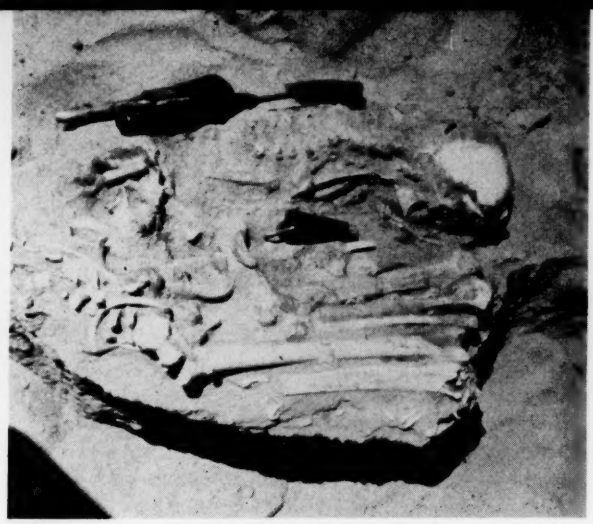
Our center of operations was Adelaide. Most of our time during the first two months was given to lectures and making plans for our trips to the interior. Some plans were made well in advance but all details had to be done after we reached South Australia. It is significant to note that Sir Douglas Mawson, famous Antarctic explorer and former chairman of the Department of Geology, University of Adelaide, not only encouraged us to come to Australia, but advised us early in our planning that we should find Tertiary mammals east of Lake Eyre if they could be found anywhere on the continent.

One of the first things we did, at the helpful suggestion of Mr. C. Warren Bonython of Adelaide, was to buy a British Land Rover and trailer. As many know, this is the English equivalent of the Jeep. It has some advantages, however, such as more carrying capacity and easier riding over the bumpy terrain that a paleontologist must cover.

Though he may have certain objectives, a paleontologist very frequently makes discoveries not anticipated. These may be as important as the discoveries he had hoped to make, if not more so. The results of our first trip into the interior fell under this last heading.

In 1939 Mr. Norman B. Tindale, ethnologist in the South Australia Museum, and Dr. J. B. Birdsell, then of Harvard, now at U.C.L.A., discovered a locality at Lake Menindee where mammalian bones were found in human cultural levels. The war came on about that time and they could not follow up their discovery. So when we arrived in Adelaide Mr. Tindale urged us to visit the locality,

* "... Where literally hundreds of square miles of level, arid plains are blanketed with untold millions of stones."—Charles P. Mountford, *Brown Men and Red Sand* (Praeger, New York, 1952). The gibbers are chert residuals on the surface of the ground, fragments of the flat-topped hills left from ancient overlying strata. Over some large areas they form a continuous cobblestone pavement.



This early Australian was compactly bundled for burial. (Stirton)

Tedford demonstrates the exact position of this flexed burial. (Stirton)

Close-up of the flexed burial. (Stirton)

Norman B. Tindale (left), and Tedford wearing headnets and bush flies. (Stirton)

which is along the Darling River in the extreme west of New South Wales.

The Land Rover and trailer served us very well as transportation to Lake Menindee. Tindale, Tedford, and I spent three sweltering weeks in late March and early April working the Menindee sites. The fossil exposures occurred in four large blowouts along the north side of the lake. There Tindale was able to identify artifacts on the Tartangan, the Pirrian, and ?Mudukian human culture levels* which he and Herbert M. Hale, Esq., O.B.E., Director of the South Australian Museum, had worked out in a site along the Murray River at Devon Downs.

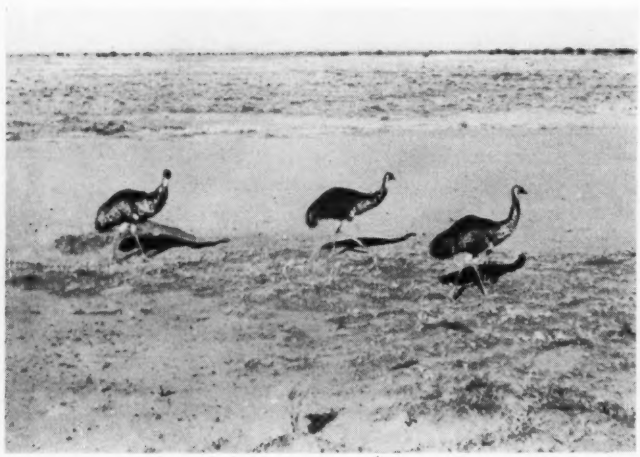
In the upper level at Lake Menindee, identified as Mudukian or a later industry, we found a human bundle burial; immediately below in the Pirrian, a flexed human burial; and in the Tartangan, the lowermost level, two human teeth, numerous artifacts, hearthstones, charred bone, and other evidence of occupation. And we found a large mammalian fauna at the lower level which included skeletons of some of the mammals, such as the rat kangaroo, a hare wallaby, an echidna anteater, and parts representing many other genera. At least 17 mammalian genera were recognized, including the extinct *Diprotodon*, the largest known marsupial, and *Procoptodon*, a giant short-faced kangaroo. Others will be recorded later.

We were at Lake Menindee in the late summer when it was still extremely hot. Bush flies swarmed over us from morning until night when mosquitos replaced them with their sanguinary intentions. As

*A time scale of human occupancy has been tentatively proposed by Mr. Tindale, with its periods termed "Australian Industries" (from late to early): Present — Western Europeans, Murundian, Mudukian; 15,000 years ago — Pirrian, Tartangan; 30,000 years ago — Gambieran, Kartan, Fulham (the last three, inadequately known, could represent one age). An *industry* means to the archeologist a human association in place and time recognizable from its works, i.e., artifacts, structures, etc.

daylight gave way to dark, the hum of millions of aquatic insects, midges, and other pests became more audible as they converged on our lantern and red gum camp fire. The white tarp in front of our tent soon was a mass of the little creatures. Earwigs and spiders dashed crazily about. There was so much fresh food they didn't know what to tackle first!

Menindee had been dry, so far as white men knew, until 1950 when a heavy flood broke the banks of the Darling River and filled the lake's basin. It is now a haven for waterfowl and shore birds. Hundreds of pelicans splashed about as they



maneuvered in converging circles on schools of fish, or as silhouettes against the skyline they flew in V's to the opposite shore. Screaming galahs (pink-headed parrots) came to roost in the gum trees overhead, and the silly laugh of the kookaburra aroused us early in the morning.

Our most important find at the Lake Menindee sites was extinct marsupials associated with man. It seemed significant to us that in this large mammalian fauna there was no evidence of the Australian wild dog, the dingo. Surely if they had been there at that time there would have been some remains around the camp sites. Tindale was very much impressed with a correlation of the human cultural levels with those at Devon Downs.

Our second expedition was much longer. We were equipped with a 3½-ton Canadian Ford truck, as well as our faithful Land Rover and trailer. Mr. Paul F. Lawson, Preparator in the South Australian Museum, and Mr. G. D. Woodard, graduate student in Geology, University of Adelaide, joined Tedford and me on this new trip to the interior. It should be remembered that on any trips into the interior of Australia a party must carry its food, most of the water, and the gasoline, although we eventually found other ways to get some of our provisions out to the interior. Though the trails at times were almost impassable — once we spent 24 hours digging our big truck out of the mud — we prospected the area west of Lake Eyre as far north as Algebuckina on The Neales Creek, always with the optimistic outlook that the next hillside exposure of the underlying sediments would give us a clue to our objective.

For a month we crossed gibber plains and drifting sand, but unfortunately we found no fossil mammalian remains. I thought we were prepared for this discouraging prospecting, but it continuously struck us that we probably should be working somewhere else. We did find evidence of a Cretaceous marine embayment with some invertebrate fossils before we returned to Marree at the lower end of Lake Eyre.

We had considerable trouble with our big truck on this trip. Once we were stranded in the middle of a gibber plain for nearly two weeks. During such intervals we occupied ourselves by prospecting as widely as possible in the Land Rover. We also made collections of Recent (living) birds, lizards, kangaroos, and dingos. The dingos are most interesting animals, having more of the manner-

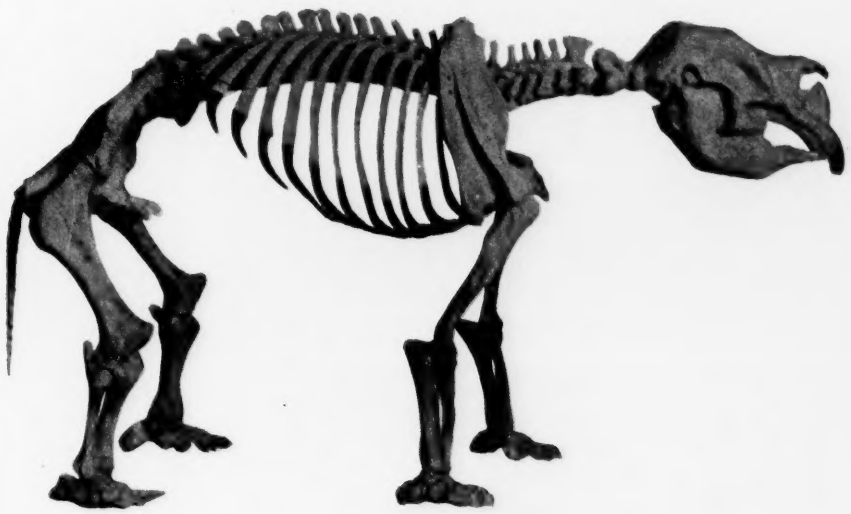
isms and habits of a German police dog than of our American wolves or coyotes. I managed to imitate their call fairly accurately and at times had them howling all about the camp.

As we drove along the trails we sometimes saw kangaroos bouncing off in the distance by the hundreds, or came upon emus that could be enticed to approach the truck simply by waving a red handkerchief out the window. It was a novel experience to encounter creatures like these in the open country instead of the wildlife so familiar to us in North America.

At the coal town of Leigh Creek we made final preparations to go into Lake Callabonna in search of the *Diprotodon* locality. The *Diprotodon* story begins in 1832, a century and a quarter before us, when the Mitchell Expedition found a bone in the Wellington caves. This and subsequent isolated finds, including many parts of the cranium and body skeleton, were sent to the British Museum where Sir Richard Owen described and attempted to reconstruct an animal that could at least be identified as a giant marsupial. But no complete skeleton was found. Then, 60 years after Mitchell, an aboriginal spotted the Callabonna site. Sir Edward Stirling and Mr. A. H. C. Zietz of the South Australian Museum excavated it in 1893. Grazing rights to this land are now held by Mr. W. A. Wilson, whose warm hospitality to us was typical of the Outback.

Mr. Hector Brooks of Adelaide told me some details of the original Callabonna discovery. It seems the aboriginal who first found the bones, having heard the people around the Callabonna Station talking about a circus and its elephants, told them he knew where there were elephant bones, and that the elephants "had been here in great numbers." He then led Mr. F. B. Ragless to the site. Instead of elephant bones, Ragless guessed, the black man had found *Diprotodon* remains – and Ragless had heard there was a standing offer of £1,000 for the discovery of a skeleton of *Diprotodon*. The gentleman tried to keep the news in wraps, but somehow the station cook heard about it and quietly quit his job, hitch-hiked to the railroad, and went to Adelaide to collect the prize. The next thing Mr. Ragless knew, there were big headlines in the paper – his cook had found *Diprotodon* and was claiming the reward. Mr. Ragless rushed to Adelaide to expose the cook's claims as false. In the end, it seems there was so much confusion about the whole affair that no one got the reward – least of all the poor aboriginal. Those were the horse-and-buggy days, and it took considerable time to reach the railway station from Callabonna. The early expeditions to the interior went by camel caravan, and after we had been out in that country I could well imagine some of their difficulties.

After its excavation in 1893 the Callabonna site became "lost" and there was much doubt that it could ever be rediscovered. It was pointed out that the place was probably nearly silted over and could no longer be seen. After several days of most discouraging prospecting on top of what we had



← **Emus *(left)*—they stand five five feet high; and salty dunes near Lake Callabonna. (Lawson)**

→ **Skeleton of the *Diprotodon* as restored, about 1/24 natural size. This marsupial was as large as a while rhinoceros. (Copyright photo, South Australian Museum, Adelaide)**

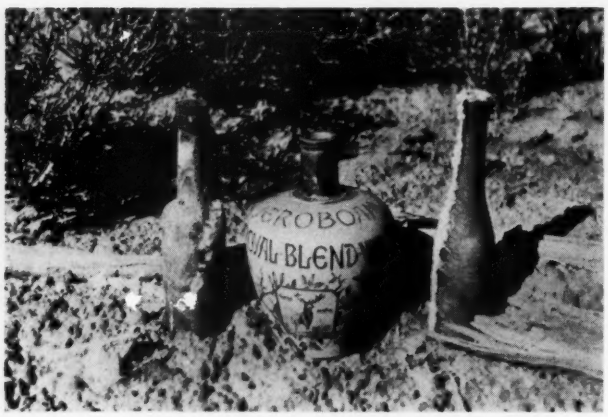
The great *Diprotodon* rediscovery, clue by clue. . . .

. . . Some old box boards, . . .

already been through, we were on the verge of believing that this doubt was fully justified.

One day when walking back across the salt-crusted lake floor, I studied the shorelines carefully, continuously taking bearings with my compass. Thus, I decided we were about three miles too far up the lake.

On the following day we drove across the floor of the lake to some island dunes three miles nearer our base camp. Before the day was over we came upon some box boards, and then other clear evidence of a camp site. Even parts of the old drying racks, and the two forked posts that held the stick



. . . getting very warm! . . .

on which the Stirling party hung the billy to make tea, were still there after 60 years. The growth of salt crystals had expanded the wood near the surface of the ground – otherwise the posts were perfectly preserved in that arid climate.

Next we looked for *Diprotodon*. There lay his bones! Shallow washes through this area caused by slight uplift to the north and west had exposed the skeletons. Most of the exposed material was badly weathered and had suffered from the growth of salt crystals near the surface.

We followed the method of Stirling and Zietz. Back from the washes on slightly higher ground we probed with ⅜-inch, six-foot steel rods. Whenever we felt something solid, it was almost invariably a *Diprotodon*. We could hardly believe no one had been back to this site in 60 years, yet such was the evidence about us.

We had 20 days of provisions left. Our big truck and camp were five miles away across the dry salt

. . . the billy posts, . . .

lake bottom. We could not get the heavier truck beyond that point. In many places the lake bottom was not actually dry, but eventually with the Land Rover we made a trail firm enough to carry all our specimens out.

In those 20 days we collected one complete skeleton of an adult, two partial juvenile skeletons, and the skull and jaws of another. I am sure none of us ever worked harder in our lives over such a short period of time. Somehow we got out all the plaster blocks with their encased fossils across the lake and into the big truck. After several unfortunate mishaps, including once when the big

. . . *Diprotodon!* Stirton probes a skeleton in the lake, one of several near the Stirling camp. (Lawson)

The *Diprotodon* skulls, and other parts . . .

truck caught fire, we managed to get back to Adelaide with our diprotodonts. Evidently it was the great number and size of the animals at Lake Callabonna that struck the fancy of the press – we hardly had a moment's peace until we could get into the field again. And there was no £1,000 reward!

Results to this point were all very interesting, and it was fascinating, particularly, to learn more about the different kinds of Australian marsupials, but we still hadn't found what we had come across the Pacific for – the Tertiary record in Australia, still our main objective.

. . . and the long hauls to the Land Rover . . .

With provisions for three, Tedford, Woodard, and I struck out again in the Land Rover and trailer for the country east of Lake Eyre. Our plan was to prospect the table erosional remnants of the so-called Eyrian rocks and all of the exposures along Cooper's Creek from Etadunna Station as far down as we could go. Again as on our previous trips we found the station people most hospitable and willing to help with time and advice. Our arrival at the stations was never a surprise since by radio and the flying doctor system they were notified ahead of time and seemed to know more about us than we knew about ourselves. (This flying doctor system is a godsend to the interior of Australia and has saved many lives.)

On this trip we couldn't carry all our gasoline, of course, so arrangements had to be made at Marree to send fuel by truck out on the Birdsville Track to Etadunna Station, which was to be our field supply base. We did carry all our food and

. . . were carefully encased in plaster, . . .

most of our water. Throughout this country we saw old deserted stations, evidence that the country was once more thickly settled. Many horses and camels were deserted on these stations, and their wild descendants have spread over the desert country. Some of the horses are among the most beautiful I have ever seen – they are derived from blooded stock, principally the saddle and racing breeds. Camels, too, were there in great numbers only a few years ago, but most of them have now been killed off because of the limited grass available for cattle and sheep. On the Birdsville Track we passed several herds of cattle being brought to

. . . ended in utter exhaustion. Geoffrey D. Woodard (left) and Tedford. (Lawson photos)

Two camels are hitched to a chuck wagon, another is alongside. (Stirton)

Marree for shipment to market. The chuck wagon following one herd was drawn by camels — a reminder of the way things were done in the past.

At Etadunna Station we made final arrangements to venture down Cooper's Creek. We struck out with our Land Rover and trailer and enough provisions for two weeks. There was absolutely no trail to follow. The first day we got stuck trying to cross the creek. Thinking we'd taken the wrong route, we made a hasty trip back to Etadunna Station for Mr. D. J. Oldfield's advice. He told us we could get through the way we had started, so we went back all the more determined. We literally fought our way across sand dunes and through the intervening valleys. At times the Land Rover was practically standing on its nose as we came down the high dunes. Eventually we worked our way down Cooper's Creek as far as Emu Camp. All there is at Emu Camp is a water hole and the remains of an old corral. No one lives in that area today. Cannatalkaninna Station, near where Burke and Wills perished on their way back across Australia from the north, is represented now by dirt mounds of adobe, remnants of the old buildings. A tattered old windmill still stands as a symbol of former human occupation.

White dunes along Cooper's Creek. (Stirton)

We studied the geology in all the exposed sections along Cooper's Creek and picked up some fossils, mostly Pleistocene, where they had washed out in the river bed. There were some remains of kangaroo, turtle, fish, and even *Diprotodon*. Obviously, though, some of these bones were older than Pleistocene, but we could find no concentration nor any indication as to where they were coming out of the exposures.

We soon realized we were not going to find what we were after along Cooper's Creek. So we struggled back toward Etadunna Station to make the best of our remaining time prospecting in other areas. On the way we stopped for lunch along the Nine-Mile Sand Dune. The idea occurred to us that it would be nice to climb up on the dune and have our lunch there to get a better look at the country. Among the first things that

Lunch (not advt.) en route. (Lawson)

came into view from that crest were escarpments around the edge of the dry Lake Palankarinna, which seemed to be about four or five miles to the west. Distance is sometimes deceiving in the Outback. We at once decided this would be a good place to prospect. In a few days we were again picking our way along and over the parallel dunes, working our way out to Lake Palankarinna. With us now was Dr. Harold C. Reynolds of the Museum of Vertebrate Zoology, University of Cali-

Stirton and Reynolds in pay dirt at Lake Palankarinna. (Reynolds, by remote control)

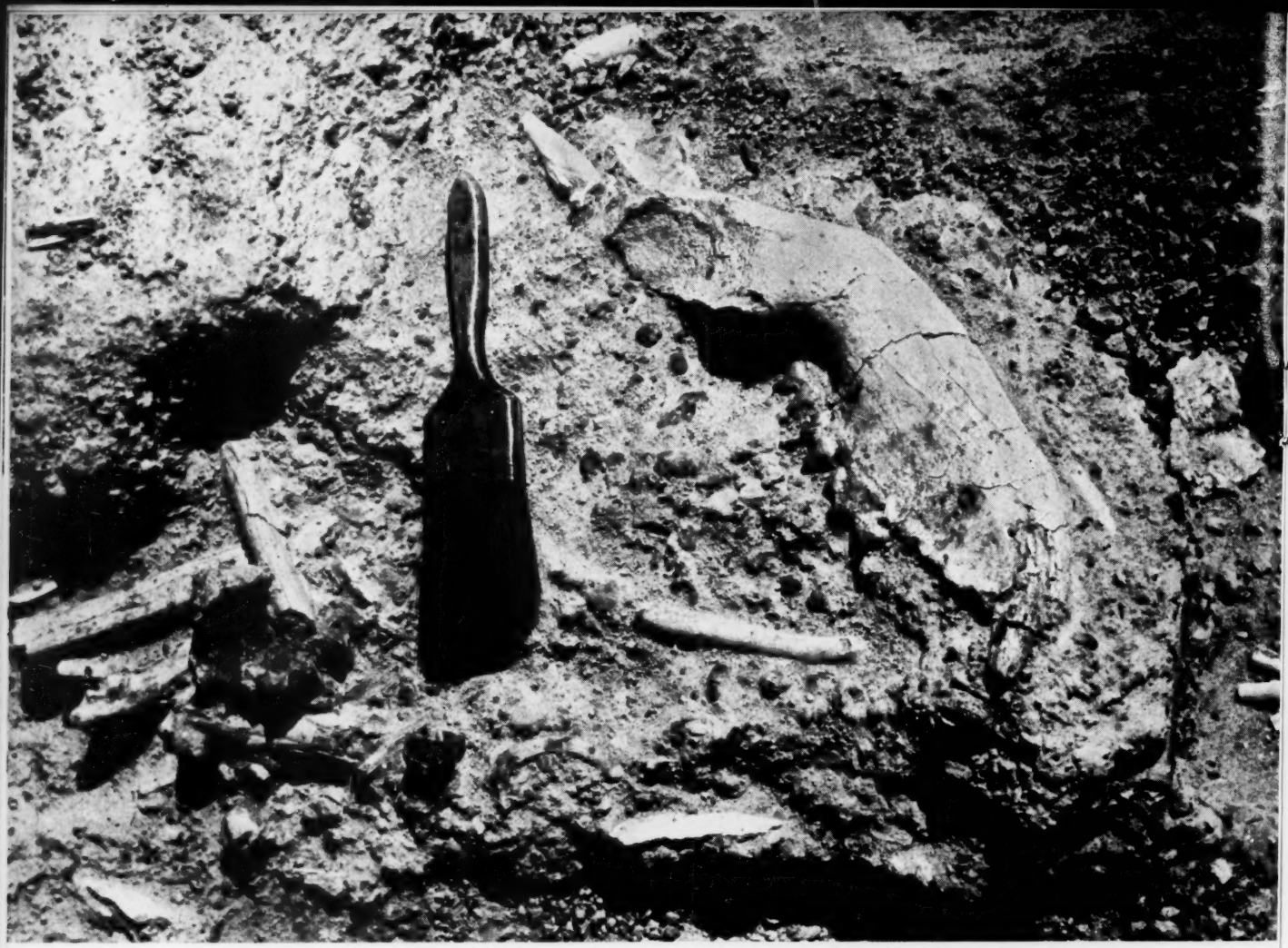
Richard H. Tedford (left), Geoffrey D. Woodard, Harold C. Reynolds. (Reynolds, by remote control)

fornia, who had come to collect recent mammals.

Once we reached our destination and established our camp, we started prospecting carefully. After three days we had covered all the exposures except about 100 yards. At this point Woodard went ahead on foot, carefully watching the slopes for evidence of bone. I went back in the Land Rover to pick up Tedford, who was concentrating on an area farther north. By the time the two of us returned, we found Woodard standing on an escarpment spur with a smile that would have stretched clear back to Adelaide. As we pulled up in the Land Rover, we saw his hands full of bone fragments – kangaroo! A quick survey of the surface showed that the material he had found was not that of one animal; several individuals were represented. It would be impossible to describe our feelings. After nearly nine months we had at last found the first link in the chain of discoveries that should be followed through the next 50 years to unveil the origin and succession of mammals "down under," one of Australia's greatest secrets. Sir Douglas Mawson's prediction was realized.

With ten days of provisions left, we got to our

Getting breakfast somehow always fell to Stirton. (Reynolds)



job "right smartly" as the Australians would say. Here Woodard had found a stream channel deposit cutting into the lake bed and it was in these sands that all of the mammalian bones occurred.

Work went rather slowly at first because we were going through the weathered surface and we took as much time as we could. Not being sure how far this concentration of materials would extend into the escarpment, we tried to save all of the material. In the time allotted by ten days' provisions, we uncovered an area about five feet wide and 20 feet long. Just as we were getting down into the best of it our tucker (U.S., grub) gave out.

Bones and jaws of the kangaroo were abundant enough to enable future study of variation in the population – 25 to 30 lower jaws and maxillaries, and many other skeletal parts as well. There are two kinds of diprotodonts, each one showing relationship to two different genera that have been described in Pleistocene faunas. There was one fragmentary bandicoot mandible. In the lake beds proper we found lungfish teeth, crocodilian remains, fragments of turtle, and many other fish bones. It was interesting to note that at a slightly different level from the channel deposit Tedford found a part of a maxillary of a koala-like form which seems to be quite different from the living genus.

Thus, we feel that the door is slightly ajar on this whole Australian Tertiary problem. We are confident from what we know now of the stratigraphy and of the region that there has been an intermittent deposition of lake bed, stream channel, and flood plain materials from the late Cretaceous on to the Pleistocene in northwestern South Australia and these beds probably continue into southwestern Queensland. Mr. Herbert M. Hale, Director of the South Australian Museum and Professor

Mandible and isolated teeth of a diprodont (new genus, not the *Diprotodon*), a pouched animal the size of a large bear, with bones of an extinct kangaroo, at Palankarinna. (Reynolds)

A. R. Alderman, chairman of the Department of Geology at the University of Adelaide, have invited us to return to Australia to continue this work. Woodard, another graduate student from the University of California, Mr. Leslie F. Marcus, and I will return in July of this year for three more months in that promising region.

The results we have accomplished to date would not have been possible without the warmhearted coöperation of our friends in Australia. They are among the most hospitable people I have known anywhere. The many courtesies shown Mrs. Stirton and me, everywhere in Australia, were deeply appreciated. I hope our initial work will be responsible for rapid strides in the development of vertebrate paleontology and continental stratigraphy in that fascinating land that still challenges the exploring scientist.

AUSTRALIAN "DOUBLE-HEADER"

THE SHINGLE-BACKED LIZARD (*Trachysaurus rugosus*), popularly known as the sleepy lizard, bobby, and stumpy-tail to the Australian pastoralist, was discovered by Captain Philip King of the Royal Navy, when he was surveying the western shores of Australia in 1825. It ranges from the grass lands of Queensland through the desert areas of the center to the giant gum forests of the southeast corner of the island continent. Its brown or blackish back with yellowish and white markings make an excellent camouflage and the animal is difficult to detect as it remains motionless in heavy cover.

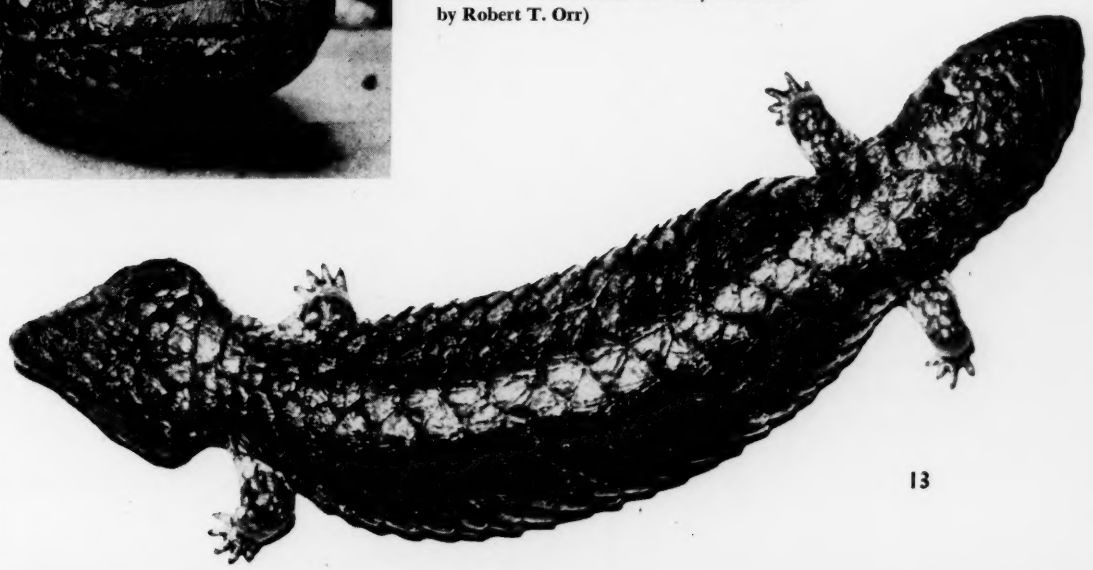
"Stumpy" grows to a length of 18 inches and is one of the comparatively few lizards that give birth to their young (usually two) alive. Its heavy shingled scales make it a rather indigestible morsel, but is occasionally falls victim to one of the various species of Australian pythons.

Not strictly a vegetarian, it feeds largely on native fruits and succulent plants, varying its diet with snails. In captivity it takes readily to a meat diet. In some districts of Australia it has been accused of raiding strawberry patches, eating the fruit just as it is about to ripen.

Probably the python is the worst of its natural enemies but as it enjoys basking on the open road increasing automobile traffic will take a heavy toll of this curious animal.

JOSEPH R. SLEVIN

WHICH WAY AM I GOING?
"Stumpy's" head is plain enough from the side, but if you are in doubt about the top view note the lay of the "shingles." (Photographed alive at the California Academy of Sciences by Robert T. Orr)



Some Birds of the Desert Spring

THE PRAIRIE FALCON (cover) is commonly found nesting in the high cliffs overlooking the desert areas of the southwestern United States. Next, perhaps, to the peregrine falcon or duck hawk it is our fastest bird of prey. Excellent hunter as well as flyer, this small hawk ranges widely over the desert for the rodents – ground squirrels, rabbits, etc. – that, along with an occasional bird, are its chief food.

The photograph was made at a rocky outcropping near Palm Springs in California's Colorado Desert. The falcons had taken over an old raven's nest for their five beautiful eggs. A strobe light shot, at 1/10,000 of a second, stopped the wings of the male, just alighting.

Texas night hawk

The Texas night hawk (page 15) commonly nests in dry washes of the Southwest. Many years ago on a walk near Sunland, California, I saw a night hawk's nest for the first time. One bird flew up, then fluttered dejectedly a short distance and nearly fell to the ground. My first instinct would have been to follow the apparently injured bird—just what she wanted me to do. But knowing the ways of the species I looked where I first saw the bird, and there were two beautifully camouflaged eggs. Later I came back to the spot and made photographs while the young hatched and were raised. The young were moved each day to a different place, and I could follow the trail of little depressions in the sand, each time, to the new location. When I finally lost track they had been moved some 500 feet away from the original spot.

This photograph was made near Santa Ana, California, where I came upon the nest in a dry wash. The mother let me approach and make as many exposures as I wanted while she tried to cover the young. See if you can find two baby birds in the picture.

Cactus wren

I spent several years trying to photograph the cactus wren (page 16) near Los Angeles, without much success. The birds were so shy I couldn't get them to come near the camera or even to return to the nest with the camera in place. One October I went to Roswell, New Mexico on a field trip and while there visited Carlsbad Cavern. Just outside the entrance I found this cactus wren busily repairing its nest, in which it stays through the winter. It was completely unwary. I set up and secured a number of shots of it carrying nesting material, without even using a blind. The species is the largest of our wrens and a very common bird of the desert Southwest. It builds a number of nests every year, but only one for raising a family. The others are dummies or roosting nests. Just a builder at heart!

Le Conte thrasher

This Le Conte thrasher's nest (page 17) is in a cholla just 2½ feet from the ground. While the species is known to be easily frightened, I found these birds completely unwary. In fact, while I was changing film and flash bulbs only 18 inches from the nest the female came and fed the young. The male joined them a few moments later and he, too, seemed unafraid, even using my foot as a step up toward the nest. The pair went on feeding the youngsters right in front of me while I got several nice shots. Such things make bird photography an absorbing game. Where one of a species may be very shy, another of the same kind may be quite unconcerned about you.

PHOTOGRAPHS BY DON BLEITZ

Phainopepla

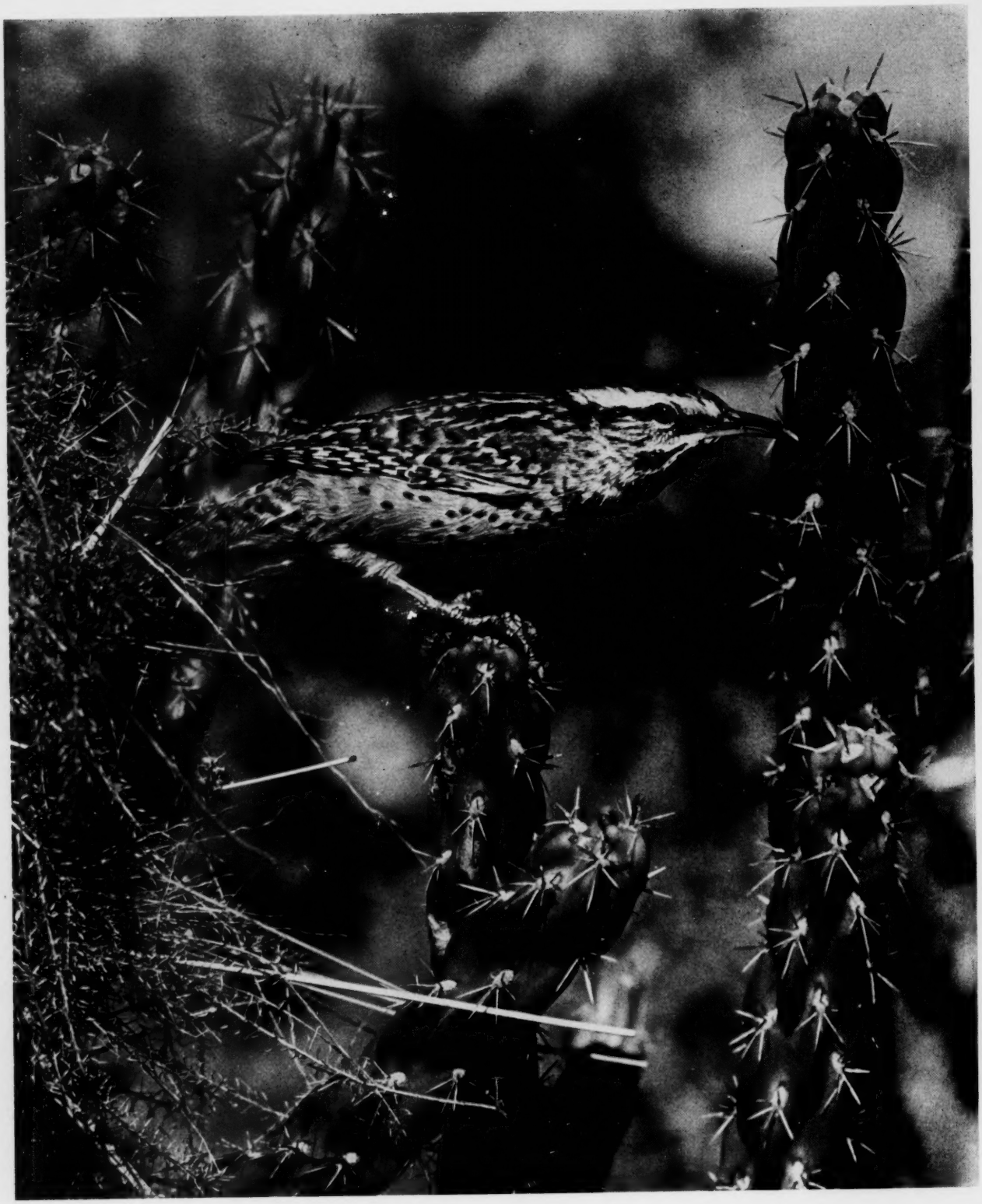
The phainopepla (page 18) is commonly seen throughout our southwestern deserts during the spring and summer. Come winter they range southward into Mexico, returning in the spring. During the last few years they have begun to invade the residential areas of our southwestern cities; in the last two I have found them nesting there, although I had never seen them in cities

This particular pair had selected a cholla cactus near Palm Springs where the two speckled eggs are safe from harm. Both parents incubate them, and by waiting patiently and making a number of shots I was able to get very good results.

Texas night hawk and two babies (can you find them?).

Gila woodpecker

The Gila woodpecker (page 19) I found nesting in the top of an old willow stub on the state refuge near Calipatria, California. It was eating all sorts of pupae, larvae, woodboring beetles, and other kinds of harmful insects. This is the common woodpecker of the desert parts of the Southwest. The male has a little red cap, the female a brown head. In Arizona they commonly nest in the giant saguaro cactus where I have often photographed them. Last year in Arizona I had caught a male Gila in my banding trap. Since it happened just after dawn I put him in a paper bag in a darkened bathroom until later. About 8 o'clock I took him out and banded him, with much commotion and squealing on his part. When I took him to the front door of our small cottage to release him I noticed another male Gila at the nest hole in a large cactus close by. The evening before I had noted that this nest was occupied by a pair. At this point the male in my hand began screaming defiance, paying no attention to me but eyeing the intruder intently. Released, my banded bird flew directly to the saguaro and grabbed the other male with his feet. Turning over and over, the two of them fell toward the ground and only at the last moment did one of them spread his wings to break the fall a bit. They rolled over and over on the ground, tusseling like a couple of kids. The banded one finally held the intruder down and beat away at his head. Eventually the intruder got away, while my bird flew up to his mate and gave her a loud bawling out for her willingness to let another male come to the nest so soon after his own departure. Birds are too much like people! DON BLEITZ



Cactus wren.

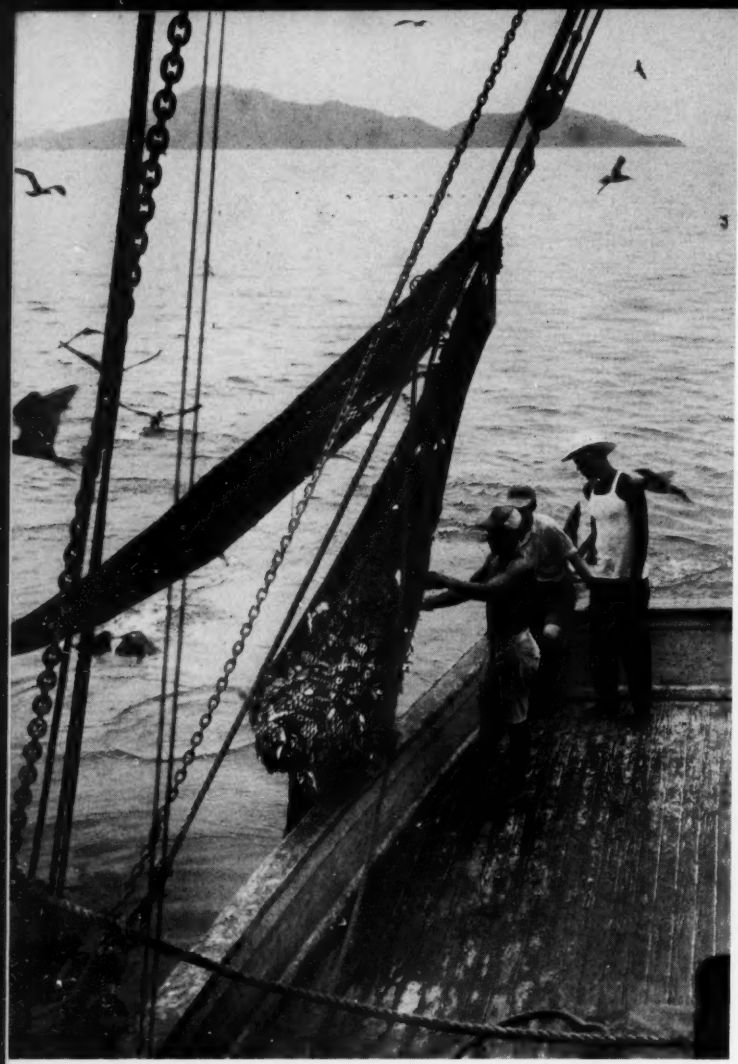
Le Conte thrasher.

hrasher.

Phainopepla.

Gila woodpecker.

ecker.



Four young scientists shop and skin-dive for research speci

Fishing in Panama Waters

BARBARA & DON OLLIS

TWO University of California at Los Angeles graduate students in ichthyology, William McFarland and Richard Rosenblatt, had just put away their swim fins, spear guns, and goggles from a fish collecting trip in the Gulf of Mexico, when another call to underwater duty came.

Dr. Bruce Halstead, medical ichthyologist at the College of Medical Evangelists' School of Tropical and Preventive Medicine, Loma Linda, was organizing an eight-week fish-collecting trip to the Gulf of Panama. Two of his assistants, Carlton Lofgren and Robert Smith, would be collecting material for Dr. Halstead's toxicity study on poisonous fishes. But they needed two more ichthyologists along to help identify and collect fish. Was U.C.L.A. interested in the trip and did they have two men available?

They certainly were! The U.C.L.A. zoölogy department was extremely anxious to obtain material from this area. Dr. Boyd Walker, under whom McFarland and Rosenblatt are working, is making a comprehensive study of the ichthyofauna of the Eastern Pacific. Since Panama is the type locality for many of the fishes originally described from this region, it was necessary to obtain actual Panama representatives to compare with fishes from other areas, e.g., the Gulf of California, the Pacific coast of Mexico, etc.

Bill McFarland and Dick Rosenblatt again packed their skin diving and collecting equipment and flew to Panama. Later they would join Lofgren and Smith and the four of them would board Mr. Woodrow Krieger's yacht, the *Observer,* to collect fish around Las Perlas Islands and on the cruise homeward. But first they had two weeks to collect around the Canal Zone.

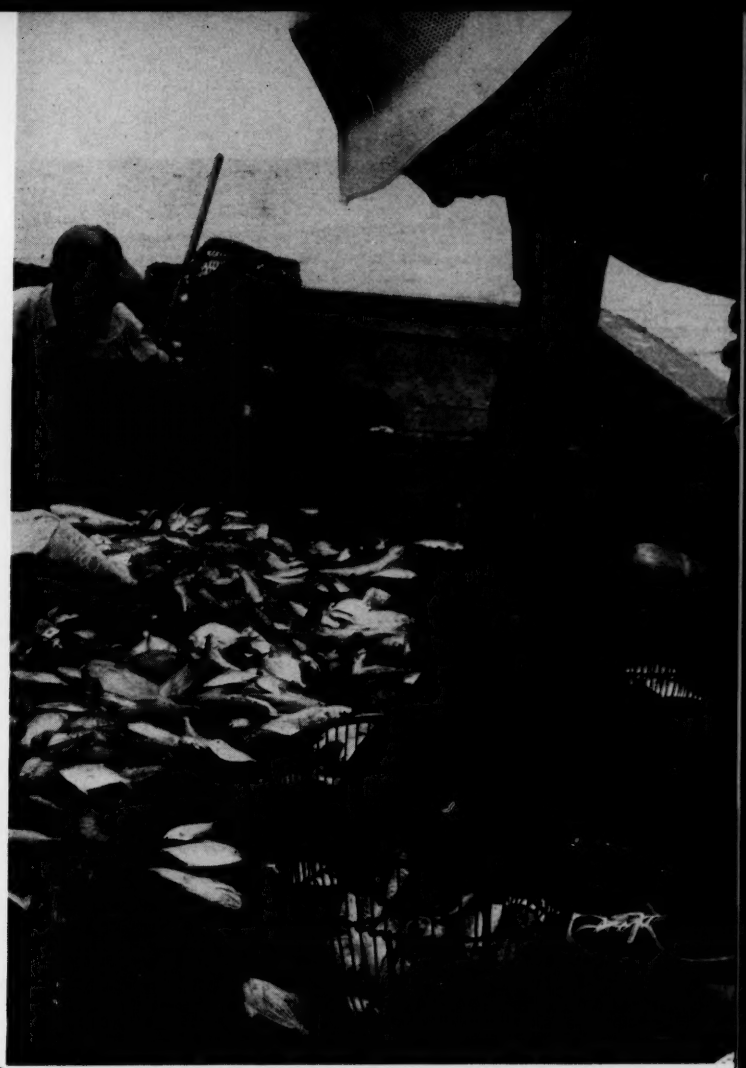
This proved somewhat of a challenge to their scientific ingenuity. The young scientists had no laboratory facilities and no transportation available. They selected a modest hotel in downtown Panama that appeared to have a broad-minded management and planned to use their rooms as a temporary lab.

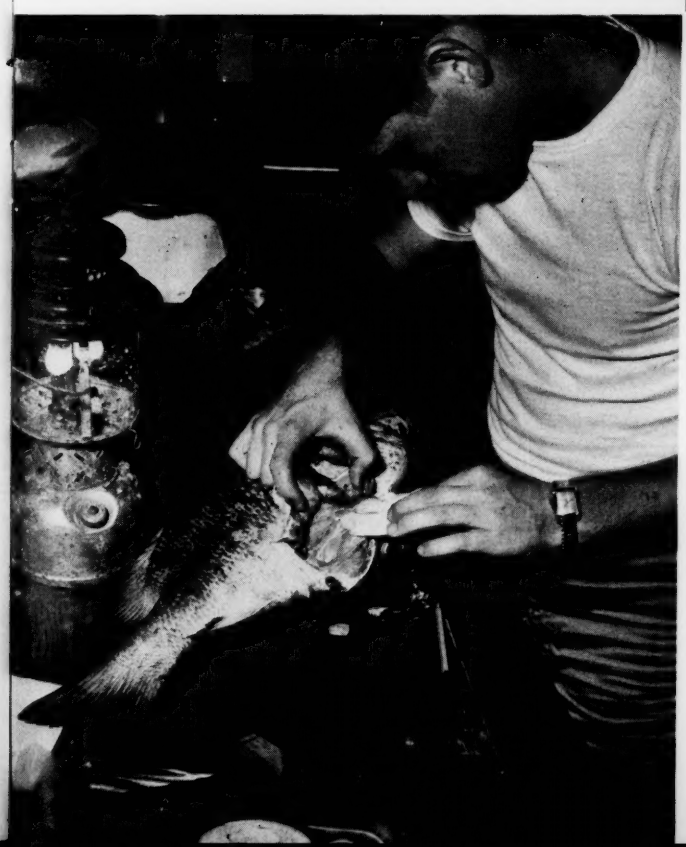
Every morning they walked, hitch-hiked, or took local buses to various spots along the coast. After a day's skin diving along the beaches it was often difficult for them to get transportation back to their hotel. Of course, they were usually loaded

down with skin diving equipment, gunnysacks of fish, and five-gallon cans filled with specimens in a formaldehyde solution. But Panamanian bus drivers, conditioned as they are to the idiosyncrasies of Americans, usually gave in, sighing something about "Turistas!"

The cold looks that Rosenblatt and McFarland received from other passengers on the buses were mild compared to the dark suspicion they soon evoked at their hotel. The two young men had begun to take advantage of another good source of specimens – the native fish markets. Since some of the fish had been in the open market for perhaps two days, it was necessary to inject them with pure formaldehyde. Every night for two weeks, Rosenblatt and McFarland took turns injecting fish in the small unventilated shower. After a few specimens were injected, the overpowering fumes sent them reeling into the bedroom where they hung out the window gasping for air.

Meanwhile the aroma of formaldehyde billowed through the hotel. Employees and guests acted as if they suspected corpses were being disposed of in the ichthyologists' rooms. However, once the manager ascertained that nothing except

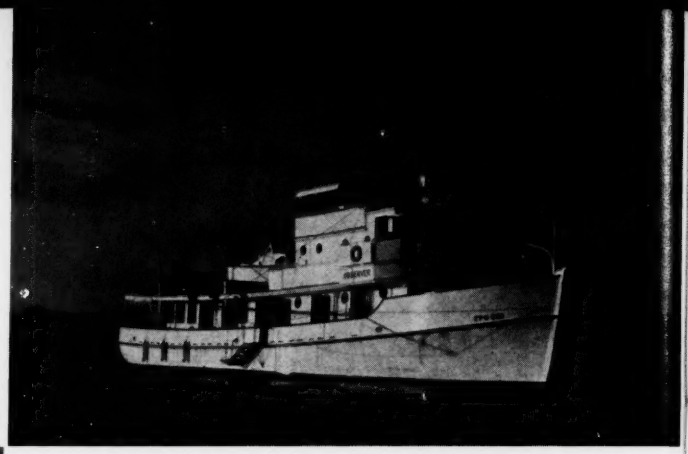




← *(Facing page)* **On board the shrimp trawler. Panamanian fishermen bring in a trawl net loaded with shrimp and assorted fish, off Taboga Island in the Gulf of Panama. (Robert Smith)**

↑ **The Panamanian sorts out shrimp, using a wooden rake to protect himself from sting rays, crabs, etc., which he tosses over to Bill McFarland, here putting a butterfly sting ray into the basket. (Smith)**

← **Carlton Lofgren extracts the liver and gonads from a specimen collected at the Taboga anchorage. There will be placed in plastic bags, labeled, and later analyzed for toxicity at Loma Linda. The upper deck of the *Observer* was converted into a lab for the ichthyologists. (Photos not credited otherwise are by Don Ollis)**



➔ The yacht *Observer* is a 97-foot diesel powered converted harbor mine sweeper, owned by Mr. Woodrow G. Krieger, president of Douglas Oil Company. Note the seine nets drying on the boat deck.

↓ Getting ready to lower away the launch. The ichthyologists used the *Observer's* motor launch for trolling and trawling.

fish were being disposed of, he explained their actions to the other guests with the Latin's all expressive shrug and remark, "Norteamericanos!"

Once they boarded the transisthmian railway to Colón in order to collect some specimens from the Atlantic side of the Canal Zone. The Panamanians warned them about the abundance of sharks in these waters. They collected hundreds of specimens on the Atlantic coast, but the few sharks they saw completely ignored them.

In the Colón market place they found a particularly good selection of reef fish. McFarland and Rosenblatt picked over the fish – selecting the smallest specimens of all the varieties of triggerfish and parrotfish they could find. With their arms full of the brilliantly colored fish, they began to haggle and argue with the proprietor in the customary manner. A group of natives gathered around, arguing volubly among themselves. When the price had been agreed upon one of the bystanders approached the young scientists. Indicating the weird assortment of fish they had purchased, he asked, "What do you want them for?" Rosenblatt explained that they were to be taken to a museum. The native turned triumphantly to his companions and said, "See, I told you they weren't going to eat them!"

Dick Rosenblatt was delighted with one specimen, *Brachydeuterus corvinaeformis,* he found in the Colón market. In general, the grunts (Haemulidae) are poorly known and Dick is making a special study of them. He is particularly interested in the genus *Brachydeuterus.* There are five American species in this genus. All occur in Panama and three were originally described from there. The specimen he secured at Colón is the one species represented on the Atlantic coast of Panama.

Upon their return to the hotel in Panama they found Robert Smith and Carlton Lofgren waiting for them. For another week the four men worked together collecting along the Panama coast line.

When they had a representative sampling of reef fishes through spearfishing, market place purchases, and collecting with the use of a rotenone ichthyocide, the young scientists talked their way

aboard the shrimp trawlers of Panama. The shrimp trawlers worked around the river mouths and here the ichthyologists collected fish that were characteristic of mud or sand bottoms.

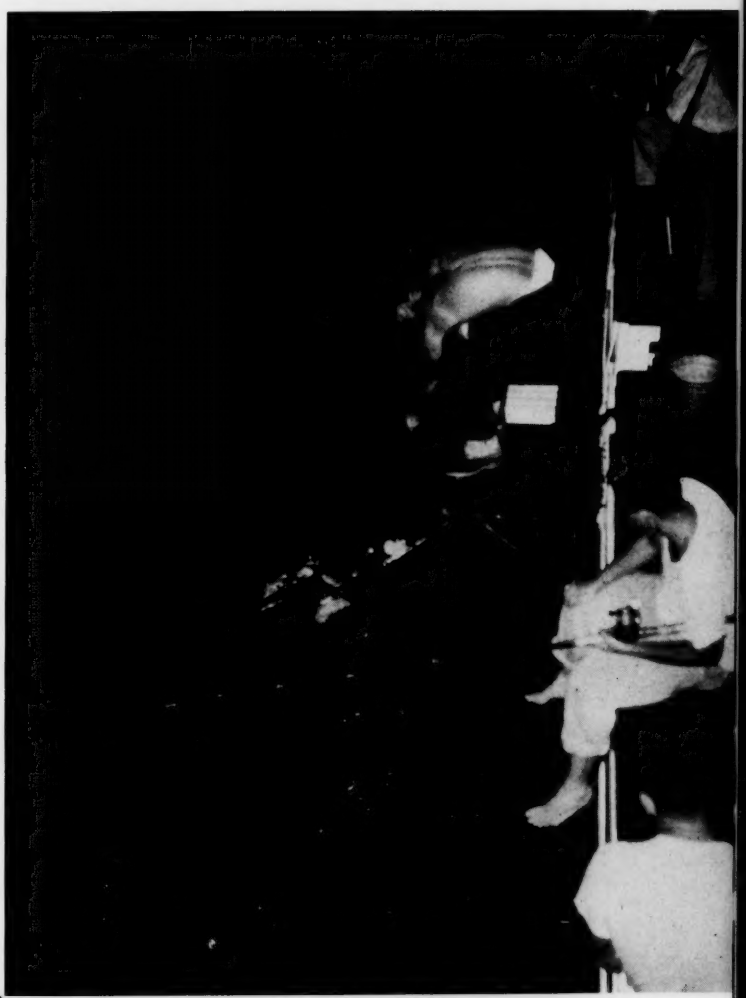
As the Panamanians retrieved the nets they dumped great mounds of sea life on the decks. They scooped out the shrimp and threw everything else to the scientists who slit the fish and tossed them into drums filled with formaldehyde. Nothing delighted the shrimpers more than to discover a mass of wiggling, snapping eels in the haul. These they threw in rapid succession to Rosenblatt who worked furiously trying to slit one wiggling eel before the next landed at his feet.

Collecting aboard the trawlers yielded over 100 different species, but it had its disadvantages. The food was miserable and since there was no bunk space available they had to wrap up in a blanket and spend the nights rolling on the open decks. By the time the research yacht *Observer* docked in Panama the accommodations looked so luxurious to the weary ichthyologists that they boarded her immediately. In less than four hours they had all their gear and drums of specimens loaded and were ready for the trip to Las Perlas Islands, 60 miles southeast of Panama City.

Here the crystal-clear water averaged about 80°F. The gorgeously colored fish were so plentiful and so curious that they swam right up to the skin divers to be speared. Great numbers of absolutely fearless groupers, snooks, parrotfish, butterfly fish, and surgeonfish flitted by in a dazzling assortment of color.

Compared to skin diving in southern California, this was an undersea paradise and the scientists spent most of their time underwater. Once Rosenblatt submerged off a deeply undercut reef, and hung there holding onto a rock and watching the marine life. Suddenly he felt a weird sensation between his shoulder blades. He turned and was face to face with a shark. It looked like a ten-foot monster. Rosenblatt didn't stop to calculate that everything looks much larger underwater – he yelled and clambered out of the water onto some rocks, sputtering to the other men. The equally startled shark sped away.

One night at Las Perlas Islands, Bob Smith, Carlton Lofgren, Bill McFarland and Dick Rosenblatt decided to try some night seining off one of the smaller islands. They took along photographer



↑ With a dipnet Bill McFarland takes small fish attracted at night by the light over the *Observer's* side. The others seem to be just fishin'.

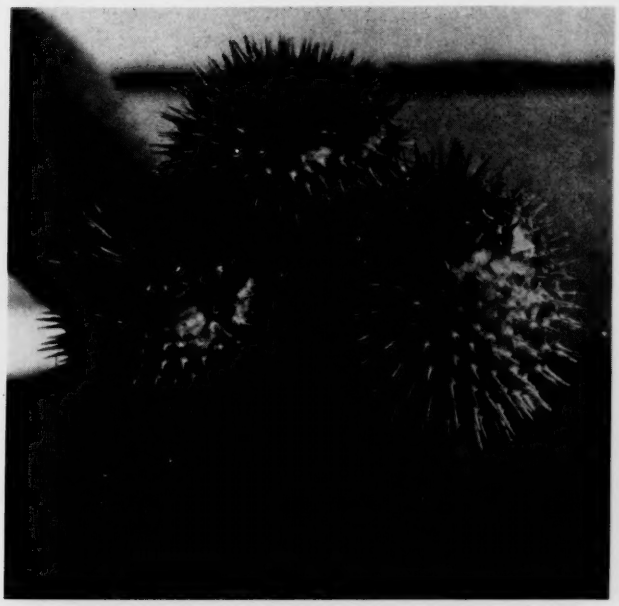
← Gaffing a hammerhead shark hooked on a hand line from the *Observer's* afterdeck.

↑ Assorted sea life brought up from the bottom in a trawl net: six puffers, a red and white starfish, a spiny urchin (far left), and a large *Strombus* shell (lower middle).

→ Bill McFarland (left) and Dick Rosenblatt examine an immature hammerhead shark in the lab at U.C.L.A. The jars are just a part of the "homework" they brought back.

← Smith at the oars; McFarland preparing to go under for the fish "suffocated" by rotenone scattered in the shallow water.

Small puffers caught by trawling.



Don Ollis and loaded nets, collecting jars, strobe lights, and cameras into a small outboard motor boat and headed for shore. Trying to land on the beach in the high surf was a tricky operation. Just when they had picked a landing point and McFarland had gunned the motor to ride a large wave in to shore, a bigger, faster wave came up behind them. The boat flipped over, spilling everyone and everything into the boiling surf. Several cameras, accessory equipment, and films were lost and the strobe lights ruined by immersion in salt water. The boat slammed against the bottom and a two-inch hole was punched in the stern.

It was a dispirited group of ichthyologists who finally collected themselves, temporarily plugged the leak, and headed back toward the yacht. With two men rowing and three bailing with their shoes they drew alongside the *Observer* just as the little boat was ready to go under.

Thereafter they confined their night work to

hanging a light over the side of the yacht. As the hours went by, an unusual assortment of nocturnal sea creatures congregated under the light. Using long handled dip nets, the scientists brought up lantern fish, larval eels, a young three-inch dolphin, and a baby sailfish, perfect in every detail and only four inches long. A preponderance of jacks and assorted herring and sardine-like fishes usually filled the nets.

Lofgren and Smith were primarily interested in collecting poisonous and venomous fish. Because of the nature of the research work to be done on this material it had to be preserved by freezing. They took tissue samples from the fish they collected, put them in little plastic bags, labeled them, and stored them in the huge freezer aboard the yacht.

Dr. Halstead and his assistants are now screen testing these samples for ichthyosarcotoxism in the laboratories at the College of Medical Evangelists in Loma Linda, California. Slices of each tissue sample are ground and centrifuged and one cubic centimeter of the fluid extracted is used for an intraperitoneal injection into a mouse.

A weekly poisonous sample will make the mouse sick, but it will survive. If the sample is strongly poisonous the mouse will die in convulsions within an hour. However, it sometimes makes a difference from which part of a fish the sample is taken. A sample from the viscera, such as the liver, gonads or stomach, may be virulently toxic when the flesh itself is not.

So far the number of poisonous fishes, their identification, and their geographical distribution are unknown. In his basic research, Dr. Halstead hopes to screen test as large a series of reef fishes from as many different island areas in the tropical Pacific as possible.

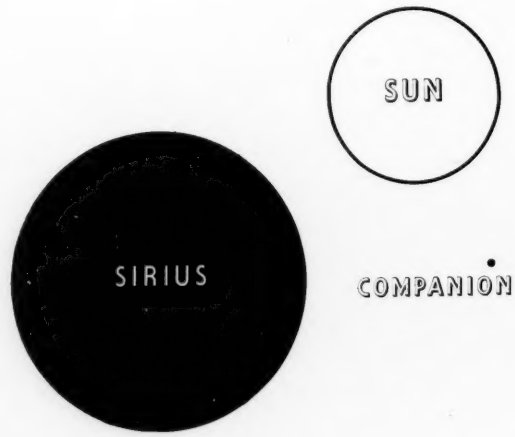
Altogether the four men collected over 300 different species around the Gulf of Panama.

Back at the laboratories of U.C.L.A., Rosenblatt and McFarland are again elbow deep in fish collections. With the identification and labeling complete on the better known specimens in the Panama collection, they are now studying the more difficult and lesser known varieties they obtained. After thorough research it is probable that they will discover several entirely new species from the Gulf of Panama area. But regardless of the discovery of new species, the results of these ingenius scientists' work will do much to aid future research based on the Panamaic ichthyofauna.

Conducted by George W. Bunton & Leon E. Salanave

SPRING SKY:

The Brightest Star, and the Zodiac's Strange Light

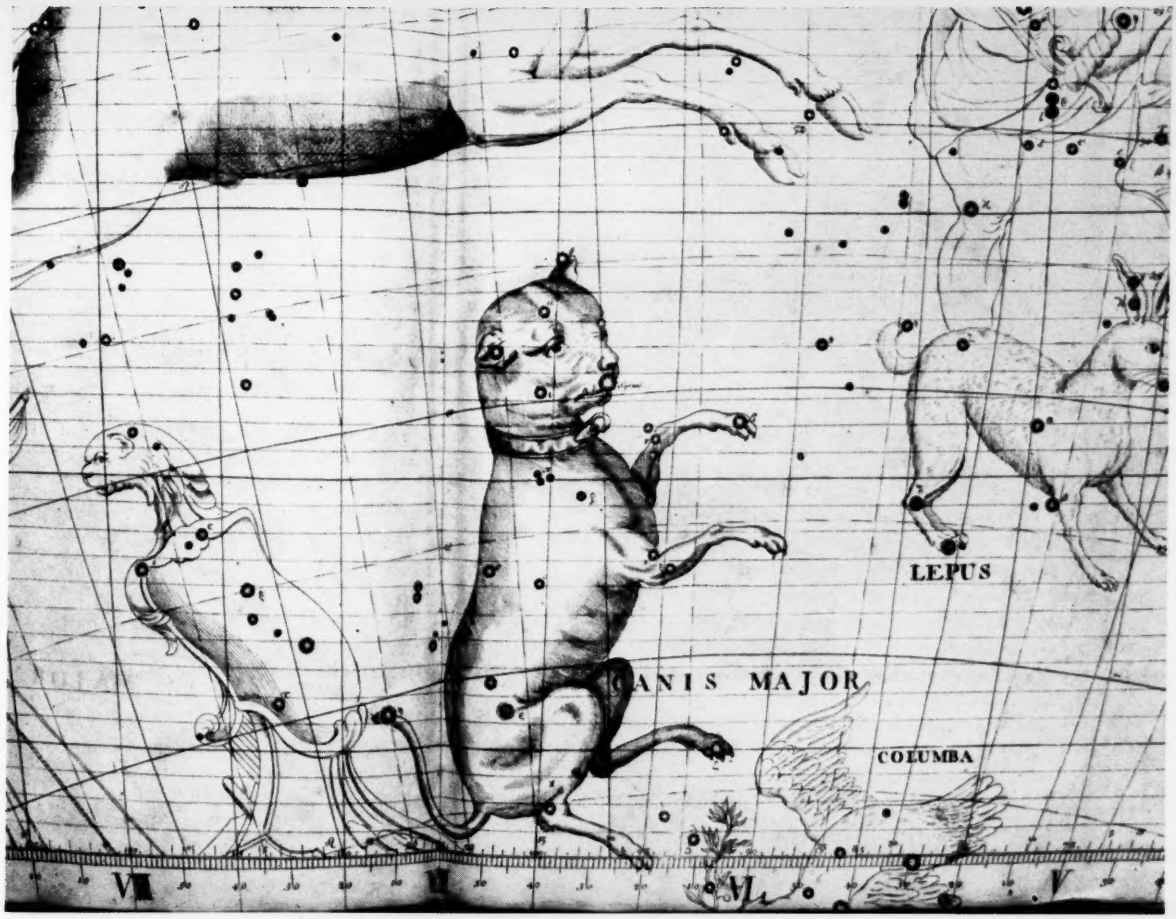


TWO OBJECTS found in spring evening skies viewed from north temperate latitudes offer the observer extremes of contrast. Low in the south the brilliant, glittering light of *Sirius* flashes; in the west the faint, diffuse glow of the *zodiacal light* forms a ghostly wedge pointing upward. Both have a fascination for astronomer and layman alike. Both have yielded up their secrets to research reluctantly.

Our brightest star

Sirius, the Dog Star, is the principal object in *Canis Major* and brightest star in all the heavens. This *apparent* superiority to all other stars has two causes. In the first place, Sirius is actually 26 times as luminous as our sun — not a giant star, but somewhat above the average. Secondly, and far more significantly, this star is one of our half-dozen neighbors of interstellar space. Light, traveling nearly 6 trillion miles per year, reaches us from Sirius in only 9 years. Just five other stars are known to be less remote than this!

During the early civilization of Egypt the Dog Star

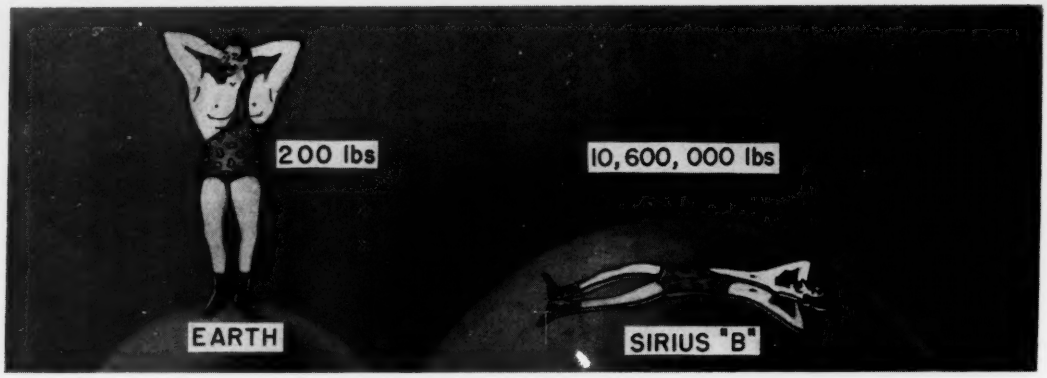


"Syrius" appears under the Dog's nose in this rendition by the artist of the *Atlas Coelestis* (London, 1729) "By the late Reverend Mr. John Flamsteed, Regius Professor of Astronomy at Greenwich." (Photographed by Mr. J. H. Chappell from the copy in the Library at Lick Observatory)

played an important role in the calendar. Known then as *Sothis,* this star was observed to rise just before the sun at a time associated with the overflow of the Nile (corresponding approximately to our month of August). Since this was the greatest event of their year, the early Egyptians set the beginning of their 365-day calendar to coincide with this so-called *heliacal* rising of Sothis. The seasonal cycle is very nearly 365¼ days long; therefore the calendar lost a quarter of a day per year. This advanced the date of the heliacal rising one day every four years, or sent it completely around the calendar in 1,460 years. This famous chronological period was known appropriately as the *Sothic Cycle.*

One of the most interesting cases in *astronomy of the invisible* centers around this star. Between 1834 and 1844 a great German astronomer, F. W. Bessel, found that the motion of Sirius was not along a straight line but in a curve. He concluded from his observations that the star had an invisible companion, and both stars were revolving around their common center of gravity as they traveled together in space. He even predicted where to look to find the companion of Sirius. But for years no telescope was capable of resolving the fainter star from out the glare of the brighter. Not until 1862 did Alvan Clark, the world's greatest lens maker, complete an instrument powerful enough to do the trick. While testing an 18.5-inch refractor destined for Dearborn Observatory, Clark accidentally discovered the faint companion of Sirius which, as it turned out, was close to the position predicted by Bessel! Even today, the observation of Sirius B is a severe test for the best telescopes.

The companion star is only 1/10,000 as luminous as the primary. But its spectrum indicates a surface temperature only slightly below that of white-hot Sirius itself. Hence the low luminosity of Sirius B is due to a comparatively small surface radiating into space. From data gathered at the Mt. Wilson Observatory in 1914 it was calculated that while Sirius is nearly twice the size of our sun, the companion star has a diameter only 1/50 of the sun's (see diagram, p. 26).



This makes Sirius B only twice the size of our earth — truly a *dwarf star.*

The most astounding fact about Sirius' dwarf companion comes to light when we learn, from its effect upon the motion of the principal star, that Sirius B is *almost as massive as our sun* and consequently its mean density is 85,000 times as great. Expressed in familiar units, it may be stated that one pint of material from inside this star would weigh 25 *tons!* For ten years after this discovery no one could explain how such a state of matter might exist. Finally, in 1924, the theory of *degenerate* matter developed in the realm of atomic physics showed that atoms, when subjected to extremes of temperature and pressure, can lose their nucleus-encircling electrons. In this situation the massive atomic nuclei can pack together to such an extent that enormous densities result. And yet such matter is still a compressible gas!

When a body has large mass and small diameter, there results a high surface gravity, i.e., objects on its surface are pulled down strongly. In the case of Sirius B surface gravity is strong enough to decrease the observed frequency of light waves radiated by atoms. This effect was predicted by Einstein's General Theory of Relativity in 1915 and verified by observations on the spectrum of Sirius B in 1924-25. On Sirius B, a 200-pound strong man would be flattened by his own 10,600,000 pounds weight — if he could survive the climate at 12,000°F.! (see sketch). And so this remarkable white dwarf star, which began its career of confounding astronomers by being discovered before it was seen, has led us through the discovery of a curious state of matter and ended up providing a case-in-point to prove a highly abstract formula involving gravitation and electromagnetic waves!

The zodiacal light

Many people who consider themselves fairly close watchers of the skies have never seen the zodiacal light. In north temperate latitudes it is best seen after sunset in March and April, when the zodiacal band in the sky makes a steep angle with the horizon. At this time the Pleiades are conspicuous, high in the west, and if the night be clear and moonless a broad wedge of faint light may be observed pointing upward toward them (see figures below and opposite).

Records of this celestial apparition are scattered in astronomical literature of the past three centuries, but generally it was thought to be some unusual twilight effect. Not until 1853 did anyone take time to make careful notes on a long series of observations. This was done by a Reverend George Jones, chaplain aboard the steam frigate *Mississippi* on a cruise to Japan. His detailed descriptions and drawings helped establish the fact that the zodiacal light is sunlight reflected from small particles scattered in the plane of earth's orbit (or the ecliptic) and nearer to the sun than the earth. The rarified nature of the material is such that the average distance between dust specks is five miles. Plans to observe the relation between the sun's corona and zodiacal light are being made in connection with the eclipse of June 30 this year.

Just one hundred years after the Reverend Mr. Jones another sea-voyager reported his long series of observations on the light. He is Captain Jan Drent, of the Dutch Merchant Marine (*Time,* Feb. 9, 1953). There are several puzzling things about the zodiacal light yet to be explained. But one thing seems obvious. If you want to help solve this astronomical problem, get a job on the high seas! L.E.S.

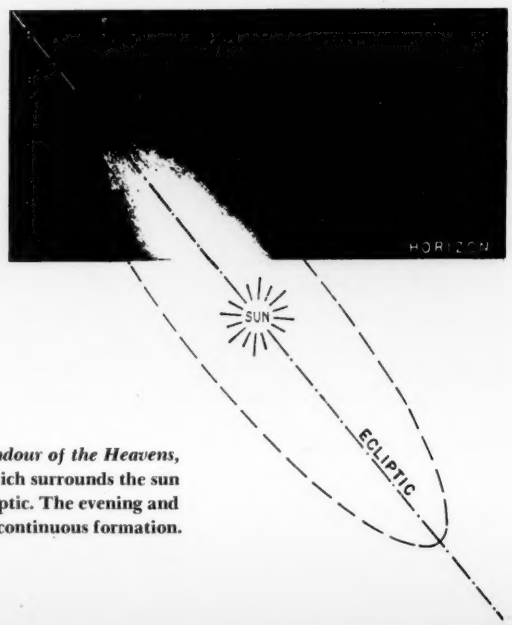


Diagram from Hutchinson's *Splendour of the Heavens,* showing the location of the zodiacal light, which surrounds the sun and extends in both directions along the ecliptic. The evening and morning light are the opposite ends of this continuous formation.

Birds across the border

Birds of Mexico: *A Guide for Field Identification.* By Emmet Reid Blake. The University of Chicago Press. 1953. xxx + 644 pp., illustrated, colored frontispiece, endpaper maps. $6.00.

Each year more and more persons from the United States visit neighboring Mexico. Many of these *turistas* are casually interested in wildlife, including birds, and a few are technical ornithologists. Both groups can profit from this valuable handbook.

The task of compiling the first field guide to birds for a region as extensive as Mexico, where many technical problems relating to speciation and distribution are yet unsolved, is indeed enormous. Such an undertaking on 967 species currently recognized in this text, however, necessarily required certain arbitrary decisions, some of which may be changed as a result of further study.

From the practical aspect one will find, for each species listed, a description, a general account of its range in Mexico as well as that of such subspecies as are involved, and, frequently, comparisons with other closely related species. More than one-third of the birds recorded are illustrated by line drawings made by Douglas E. Tibbits. Enhancing the value of this book also are the endpapers, one of which shows the vegetation zones of Mexico and the other a map of that country. The author, the illustrator, and the University of Chicago Press are to be commended highly. R.T.O.

DISCOVERY IN BOOKS

Many Australias

Rum Jungle. By Alan Moorehead. Charles Scribner's Sons, New York. 1954. 181 pp., 19 photographs, map. $3.50.

Brown Men and Red Sand: *Journeyings in Wild Australia.* By Charles P. Mountford. Frederick A. Praeger, New York. 1952. xv + 184 pp., 69 photographs, numerous drawings, endpaper map. $4.50.

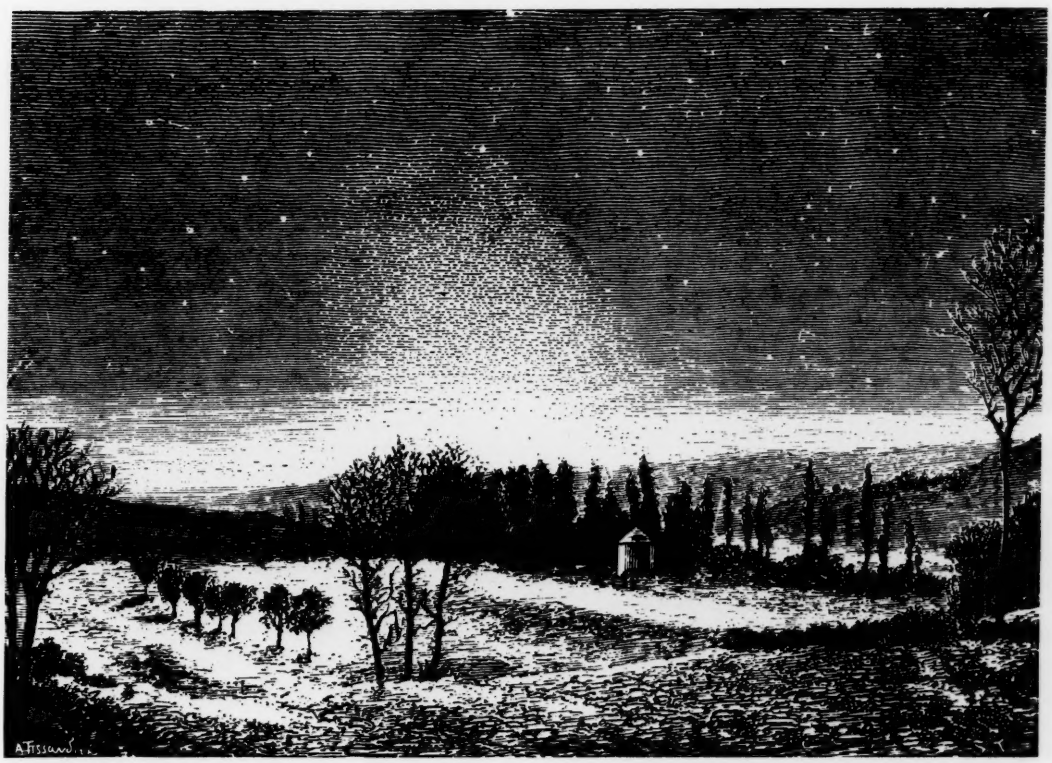
Adam in Ochre: *Inside Aboriginal Australia.* By Colin Simpson. Angus & Robertson, Sydney and London. 1952. Frederick A. Praeger, New York, 1953. 221 pp., profusely illustrated with photographs (many in full color), drawings, map. 25s. $5.00.

Australia. Edited by C. Hartley Grattan. The United Nations Series. University of California Press, Berkeley and Los Angeles. 1947. xxviii + 444 pp., 12 halftone illustrations, 2 maps. $5.00.

Lesley Simpson's idea (*Many Mexicos*) can be widely extended, but nowhere better, perhaps, than to Australia. Our small selection of books illustrates the point very well.

Rum Jungle (published March 15) comes out of a gifted Australian expatriate journalist's rediscovery of his native land. Although it takes its title from the spot in the North-

The zodiacal light in 1874. (From *The Story of the Heavens* by Sir Robert S. Ball. Cassell & Company, Ltd., London, 1910)



ern Territory where a staggering uranium strike was recently made, and heralds that event as one of great portent in the atomic age, it is also a book about the coral pools of the Great Barrier Reef, about koalas, sheep stations, and the everyday lives of typical Australian families in Sydney and Melbourne.

Alan Moorehead was born just before World War I into an Australia that took pride above all in being English. All were expatriates, even though descended from the founding colonists, and cherished their sense of isolation. To go abroad was the thing, especially to make a trip Home, to England. Young Moorehead's average life was good, what with family outings and all, but – he quotes Maeterlinck – there was " 'a nameless, hopeless distress,' " which, he decided, only travel would ease. So after college he took "the Trip."

He was away ten years, then another six. Somehow life outside (in Mediterranean France and Italy) seemed richer. But now he can say, after his second return, "I myself must certainly have changed in all this time but I believe that Australia, or rather the contemporaries I left behind there, have changed even more. They are no longer an appendage of Europe; they are emerging into something quite different." Rediscovery came through travel – trips across Australia he had always intended taking, and revisits to old haunts through memory as he writes, in London. (After reading *Rum Jungle* one wonders how he could have left Australia, again! If Moorehead had to go abroad to learn to write uncommonly well, however, and with a cosmopolitan touch, we may be glad he did, that first time – as a guide he is full of enthusiasm but not provincial about it.)

Where Moorehead likes his Australia the best is just where modern civilization has touched it the least. He took the weekly train to Alice Springs in the arid center. From the railhead he drove the war-built highway – "an astonishing road" – to Darwin, savoring the things of the bush. "A flock of cockatoos rises up screaming from a waterhole. A mob of wild horses breaks across the track . . ." And ". . . where you begin to touch the edge of the tropics" as you go northward, ". . . you become uneasily aware of the anthills . . . marching steadily beside you." From little mounds they have grown, with the increase in vegetation, to eight-foot Gothic cathedrals. ". . . You can quite easily be seized with an illusion that you are being watched and followed; that the ants are going to come and get you too in the end."

Rum Jungle itself and the Woomera rocket range remind us of what is more likely to get us all, in the end, and we are glad once more to be transported to a place of natural wildness, to the Great Barrier Reef, which ". . . remains almost deserted, miles and miles of it, an infinity of coral, too much of it really to comprehend, but perhaps in its way the loveliest thing on earth."

This is an amazingly well packed short book: here is Stuart's epic first crossing of the Northern Territory in 1862, after six tries. No book on Australia can fail to say something about the aboriginal; in his lament over white treatment of him Moorehead, however, saying "his race has been pretty well exterminated in the process" of making the fast jump from stone age to atomic age, runs precisely counter to Colin Simpson, another informed Australian journalist, who finds the "blackfellow" on the increase today. (Wonder just how accurately the tribesmen have been counted, and plotted on curves by the various agencies?).

Offshore in Bass Strait south of Melbourne lies Phillip Island, which the Commonwealth has wisely reserved as a wildlife refuge. Mutton birds (puffins) nest here, seals come ashore, and penguins waddle up the beach loaded with fish for their young. Koalas doze away their days in the gum trees. For us the high of this engaging book is in Moorehead's account of these wild creatures as he saw them on various visits to the island. The part about the penguins, especially, we would put with the best nature writing we know. For the book as a whole, as an introduction to Australia it brings the feel and the smell of the earth and the heart and soul of those who live thereon. Advice to the author: Go back and keep writing about your land! The sample was first chop.

There is no need, fortunately, to live longer on misconceptions about the Australian aborigines, "bushmen," "blackfellows," or whatever name stems from one's knowledge and attitude. It would not be invidious to say that even some Australians have maintained attitudes, stemming from misconceptions, prejudiced or not, toward the darker but earlier Australians, just as we Americans have done, with the Indians. But perhaps we and the Australians both are coming slowly into the light. Two books assuredly well read by now in Australia have recently been made available to us on the northeast side of the Pacific: Charles P. Mountford's *Brown Men and Red Sand*, and Colin Simpson's *Adam in Ochre*. They shed much light.

The name of Charles P. Mountford, eminent Australian ethnologist of the University of Adelaide, became widely known to American readers through his article, "Exploring Arnhem Land," in the December 1949 *National Geographic Magazine*, which resulted from his leadership of the Commonwealth of Australia – National Geographic – Smithsonian Institution Expedition to Arnhem Land, 1948. *Brown Men and Red Sand* is the story of his journey some years earlier among the aborigines of another wild part of Australia, far southward on the border between South Australia and the Northern Territory. While the Arnhem Land expedition was a highly organized, large scale affair operating in and from established bases, this one to the Musgrave and Mann ranges, Mt. Conner, Mt. Olga, and famous Ayers Rock in the desert heart of the continent consisted of Mr. Mountford, a young companion, a native camel train, and, for part of the way, Mrs. Mountford.

Mountford's story concerns people still living their stone age lives on ancestral ground in intimate association with its strangely beautiful rock hills, its springs, its plant and animal life upon which primitive human life utterly depends. His genuine love and respect for these fellow Australians opened to Mountford their ancient beliefs and

Emus and their tracks. An example of aboriginal art from Arnhem Land, Australia. (From *Adam in Ochre*, courtesy Angus & Robertson and Frederick A. Praeger)

legends which give their lives dignity and worth, however primitive their material culture may seem in comparison with ours. He found them courteous, kindly, and universally artistic and imaginative to a high degree. His book, which is generously illustrated with his own superb photographs, is a true and full-length portrait of the Australian aborigines where they are still largely in their ancient state. From it they emerge as individuals — as persons, worth knowing and understanding, never again to be regarded and dismissed as virtually subhuman primitives who are on the way out anyhow, mere stone age holdovers or still extant "missing links." On their own ground, in their complete mastery of living in one of earth's harshest human habitats, they are a successful and respectable part of the human family. What has all too usually happened to them under other forms of contact with white men is another, largely tragic story, the old, world wide story of white dominance over "backward" peoples.

Colin Simpson was the happy choice of the Australian Broadcasting Commission to "cover" the Arnhem Land expedition of 1948. *Adam in Ochre* begins as the story of the expedition's field work in various branches of the natural and anthropological sciences. Under the skillful journalist's eye for the main show — nothing interests people more than people — the book swings into ever sharper focus on the bush natives of the Arnhem Land region westward to Darwin and Melville Island. Thus it turns out to be more an intensely vivid graphic presentation of the Australian aborigines than a chronicle of the largest scientific expedition ever to penetrate their partly still unexplored tropical reserve of the north. Nevertheless Simpson has blended in much of the Expedition's work, with engaging pen-portraits of its personnel; he takes us on buffalo hunts with their wild drama and bloody cruelty; and he gives us clear views of the land itself. There are indeed many Australias. Where the continent looks to the Indies hanging below the Equator, its jungles may not be as lush as theirs, but there are rivers and the billabongs to make the contrast with the deserts inland a matter of easier living, with perhaps more time for corroboree to the tune of didjeridoo and balnook-nook.

Arnhem Land's green parklike valleys and savannahs are capped with "fretted uplands" where the deeply cleft sandstone has provided caves, galleries, and overhangs — galleries indeed of aboriginal painting and drawing. Here is one of the highs of human creative expression, to be ranked with the far more famous cave art of France, Spain, and Africa. It might be said that the artist in these people, living and long gone, is what interested Simpson the most. It could hardly have been otherwise, where a culture reaches its highest expression in graphic design, music, and the dance, with every person a performer of one or several talents. Simpson's job was to record as much of it as possible, on film and wire, to bring increased knowledge and appreciation to the many Australians who were virtually unaware of what lay in their remote north. That the book, at least, hit its mark is proved by its best seller standing in Australia. We can guess two reasons besides the popular appeal of exploration: the aboriginal in Australia has the fascination of the Indian in America, and Australians too have a void of knowledge to be filled. For the other, writing about nature is again at high tide, and perhaps people have been telling others some of the sheer beauty in this

PHILOSOPHICAL LIBRARY BOOKS

☐ **SUCCULENT PLANTS by A. Bertrand.** Their cultivation and classification. **Profusely Illustrated.** **$4.75**

☐ **PLANT DISEASES in Orchard, Nursery and Garden Crops by Ernest Gram** and **Anna Weber.** Produced for the first time in an English edition from **Plantesygdomme** by two Danish horticultural experts; a Danish work of world-wide reputation. **Illustrated.** **$18.50**

☐ **THE SOCIAL INSECTS by O. W. Richards, D.Sc.** Dr. Richards shows that the scientific approach has been able to lay bare far more of wonder and amazement than speculation or legend. **"Warmly commended"—Julian Huxley. Illustrated.** **$4.75**

☐ **ALONG THE GREAT RIVERS by Gordon Cooper.** The Nile, the Zambesi, the Yangtze, the Ganges, Murray, Volga, Danube, Mississippi, St. Lawrence and Amazon—these are the great rivers which the author has chosen to describe: the stories of their lives from source to mouth, their antiquarian and legendary lore, and the people and places on their banks. **Illustrated.** **$4.75**

☐ **SPADEWORK IN ARCHAEOLOGY by Sir Leonard Woolley.** There is no name among archaeologists better known than that of Sir Leonard Woolley. The present volume is a collection of reminiscences. **Illustrated.** **$4.75**

☐ **OUR NEIGHBOR WORLDS by V. A. Firsoff.** A survey of the solar system in conformity with the most recent information is used as a basis for a careful investigation of interplanetary travel. **Illustrated.** **$6.00**

☐ **NUCLEAR PHYSICS by Werner Heisenberg.** Deals, among other things, with Bohr's theory, the periodic system and the extra-nuclear structure of atoms. The main subject of the book includes radioactivity, the binding energy of nuclei, nuclear structure, artificially induced nuclear transmutations and with the methods of observation and of producing nuclear transmutations. The work concludes with some account of the practical applications of nuclear physics. **With 18 halftone illustrations and 32 line illustrations.** **$4.75**

☐ **CURIOUS CREATURES by Erna Pinner.** The author gives examples of curious behavior in the struggle for food, in nest-building, in paternal nursing; she shows us birds that cannot fly and four-footed animals that can; creatures which, either for protection or for aggression, make themselves appear what they are not; creatures living on other creatures for better or for worse; creatures ranking as giants in their own particular sphere. **Illustrated.** **$4.75**

☐ **THE REBIRTH AND DESTINY OF ISRAEL by David Ben Gurion.** A victory dreamed of for centuries is described in the words of its chief architect, one of the greatest pioneers of the Jewish rebirth. **$10.00**

☐ **HISTORICAL ASPECTS OF ORGANIC EVOLUTION by Philip G. Fothergill.** The literature on evolution in all its branches is extensive, but so far there has been no book dealing with the "evolution of evolution"—that is, with the gradual development of the concept of biological change through the ages, and its application in various stages of man's understanding of the physical world. Dr. Fothergill's book is a serious attempt to fill this requirement. **$6.00**

☐ **GEOGRAPHY IN THE TWENTIETH CENTURY by Griffith Taylor.** Twenty specalists explore the growth, fields, techniques, aims, and trends of modern geography. **$8.75**

☐ **WAVES AND TIDES by R. C. Russell and D. H. Macmillan.** For all those interested in the sea, whether for pleasure or professionally. **$6.00**

☐ **THE COMPOSITION AND ASSAYING OF MINERALS by John Stewart-Remington** and **Dr. Wilfrid Francis.** The book is intended to be a guide to mineralogy. The crystalline forms of numerous metallic minerals are referred to in the descriptions of the ores mentioned. **$5.50**

☐ **THE WORLD AS I SEE IT by Albert Einstein.** Professor Einstein's first general book, in which he set forth his thoughts on life, on the world about him, and on his scientific labors. Charming, witty, shrewd observations and intimate revelations. **$2.75**

☐ **A CONCISE HISTORY OF ASTRONOMY by Peter Doig, F.R.A.S.** A new volume which provides a comprehensive and concise account of the development of Astronomy from earliest times to the present. **$4.75**

☐ **ARCTIC SOLITUDES by Admiral Lord Mountevans.** A concise history of the expeditions which have ventured in search of the North-East and North-West Passages, and of the North Pole itself; from the early explorers like Davis and Hudson, through the great achievements of Nansen and Amundsen to the modern conquest of the pole by air. **Illustrated.** **$4.50**

☐ **THE LOST PHARAOHS by Leonard Cottrell.** How the secret of the resting places of the Pharaohs was discovered—the incredible vision which greeted those who first gazed on the Tutankhamun discoveries, and the far-reaching effect of the discovery of the Rosetta stone on the history of Egyptology are just a part of this amazing story which will bring to its readers a new understanding of the romance and fascination of Ancient Egypt. **Illustrated.** **$6.00**

☐ **SCIENCE AND MAN'S BEHAVIOR by Trigant Burrow.** The author presents a completely fresh, biological approach to the problem of behavior-disorder, individual and social. **$6.00**

MAIL THIS COUPON TODAY

PHILOSOPHICAL LIBRARY, Publishers
15 East 40th Street, Desk 661, New York 16, N. Y.
Send books checked. To expedite shipment I enclose remittance

$.....

NAME.....

ADDRESS.....

book. We would put up one chapter, "The Morning of the Birds," against anything of its kind. Then there is "Kakadu Naked." This is a curious inner fifth of the book. It casts in poignant fiction the essential truth of everything Mountford or Simpson has to say about the tragic impact of two peoples. You will not soon forget it.

These books have shown facets. What of Australia as a modern nation, and how she became what she is today? One of the best sources of general information, with emphasis on history, economics, and politics, is the *Australia* of the United Nations Series. Editor C. Hartley Grattan is well known for his *Introducing Australia*. He and Professor Robert J. Kerner, general editor of the Series, have assembled a distinguished battery of 28 Australian experts to write as many chapters grouped in seven parts — The Scene, Historical Background, Constitution and Political Development, Economic and Social Development, Cultural Aspects, Australia and the Southwest Pacific (a chapter on "Native Peoples" is here), The Second World War and After. Mr. Grattan has compiled an annotated bibliography. There are many charts and tables; we dare say one could find the figures to illustrate almost any fiscal or economic point. The book unfortunately has no general reference map, only an outline key to historical events.

One recent book dealing with the Australian past Dr. Stirton has opened to us in his article, is **The Face of Australia** by Charles E. Laseron (Angus & Robertson, Sydney and London). Since a copy is not yet at hand, we are judging by the commendatory review in the September 1953 issue of *Walkabout*, the Australian geographical magazine, that it is a splendid presentation of the geological story behind Australia's present landscape, and of the evolution of the bush. The reviewer, who signs himself "Scrutarius," says: "The book is illustrated with a wealth of excellent photographs, diagrams and maps. It is quite the best current work of its kind I have seen."

Furred Animals of Australia. By Ellis Troughton. Angus & Robertson, Sydney and London. Fourth (revised) edition, 1951. xxxii + 376 pp., 25 color plates. 30s.

First appearing in 1941, Ellis Troughton's book has become the standard natural history of Australia's curious and unique mammals. Here vividly described are over 400 species, nearly half illustrated in full color — the platypus, echidna, Tasmanian wolf, Tasmanian devil, bandicoot, koala, wombat, dingo and all; more different kinds of kangaroos, wallabies, and wallaroos than most of us ever knew existed; various rodents and numerous bats; and even seals, whales, and sea cows — all in one attractive volume.

Another classic (same publisher) that we believe to be again in print is T. C. Roughley's **Wonders of the Great Barrier Reef**, a must for any comprehensive library of Australian nature, beautifully illustrated. D.G.K.

Along the Great Rivers. By Gordon Cooper. Philosophical Library, New York. 1953. 159 pp., 23 photos. $4.75.

There are many ways to treat of rivers — land-borne link in the eternal and vital ocean-rain cloud-running water cycle, carvers of canyons and leveler of hills into plains, and so on. Gordon Cooper speaks mainly of rivers and men, of rivers flowing through human history and culture, nourishing, transporting, impeding, inspiring, and destroying men. A world traveler, he naturally talks of great rivers — the Nile, Zambezi, Yangtze, Ganges, Volga, Danube, Mississippi, St. Lawrence, Amazon, and the Murray.

The Murray? The world generally knows little of it, but it is Australia's great river. Without the Murray-Darling drainage system Europeans could hardly have settled the interior, southeast of the deserts. Cooper's chapter on the Murray-Darling contributes an interesting passage to our Australia theme, and a perhaps unexpected link to California. The brothers George and W. B. Chaffey took over the drought-ridden Mildura Station, bridled the Murray to irrigation, created a vast fruit garden and ultimately a thriving community. Then George Chaffey came to California and created the garden of the Imperial Valley.

Somewhere in New Guinea. By Frank Clune. Philosophical Library, New York. 1952. xii + 356 pp., illustrated with drawings by Syd Miller.

The journalists have it, so it seems. This thirty-fourth book credited to the Irish Australian Frank Clune (he mentions another in preparation, about New Guinea today) is a product of an indefatigable searching for the story behind what goes on in remote places. *Somewhere in New Guinea* is the story behind the fabulous New Guinea gold strikes — the prophecy in Saavedra's naming the huge island, in 1528, "Isle de Oro" has been fulfilled during the last half century in one of the most difficult gold rushes the world has ever seen. Beyond the romantic but true tales of prospecting and developing despite incredible hardships Clune looks seriously at future prospects for Australia's big responsibility across the Torres Strait.

The book was printed — well printed — in Australia. The drawings have all the life and twice the punch of photos. The American edition seems to be out of print. D.G.K.

Valedictory

The Perennial Adventure: *A Tribute to Alice Eastwood, 1859–1953.* By Susanna Bryant Dakin. California Academy of Sciences, San Francisco. 1954. 50 pp., illus. $3.00.

Alice Eastwood surely would have been delighted at the sparkling fresh crispness of the slim keepsake volume published on the ninety-fifth birthday she nearly lived to see. San Francisco's most careful printer, Lawton Kennedy, has looked to the format with his invariable good taste and craftsmanship, thus *The Perennial Adventure* by Susanna Bryant Dakin is designed to be cherished by collectors of beautiful books as well as by collectors of Eastwoodiana.

For the brief story of a life not only longer than most but uncommonly full of adventure, hard work performed with joy, numberless friends, and earned recognition, Mrs. Dakin gratefully acknowledges her indebtedness to Alice Eastwood's biographer, Carol Green Wilson. Miss Eastwood's own paper which follows, "Early Botanical Explorers on the Pacific Coast and the Trees They Found There," was first published in the California Historical Society *Quarterly* for December 1939. And besides contributing his brief foreword, John Thomas Howell, who succeeded Alice Eastwood to the curatorship of Botany in the California Academy of Sciences, found among her papers the old yellowed clipping from the Denver *Tribune* containing her praiseworthily brief Valedictory to the Class of '79, East Denver High School, which, save for notes, closes this "Tribute to Alice Eastwood." D.G.K.

Those who knew her
will want a copy

The Perennial Adventure
A Tribute to Alice Eastwood

by

Susanna Bryant Dakin

Foreword by John Thomas Howell

"Perennial Adventure," by Susanna Bryant Dakin
(Based on an Eastwood biography by Carol Green Wilson)

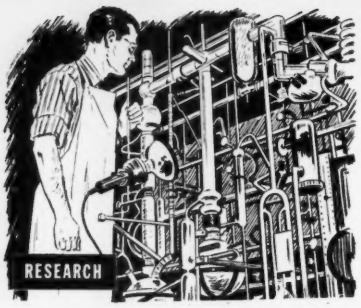
"Early Botanical Explorers on the Pacific Coast and the Trees They Found There" by Alice Eastwood. Reprinted from the *California Historical Society Quarterly,* December, 1939

Valedictory address, East Denver High School, 1879, by Alice Eastwood

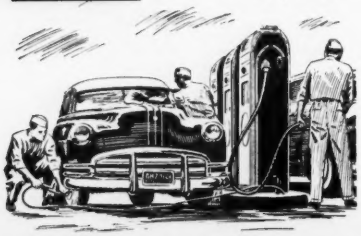
This unique book has been published by the Academy under the sponsorship of the Marin Garden Club. Proceeds will go to the Alice Eastwood Hall of Botany fund as a contribution from the club. The book was printed by Lawton Kennedy.

Price: three dollars plus tax
Order from: Department of Botany, California Academy of Sciences, Golden Gate Park, San Francisco 18, California. Telephone BAyview 1–5100

(See review on page 32)

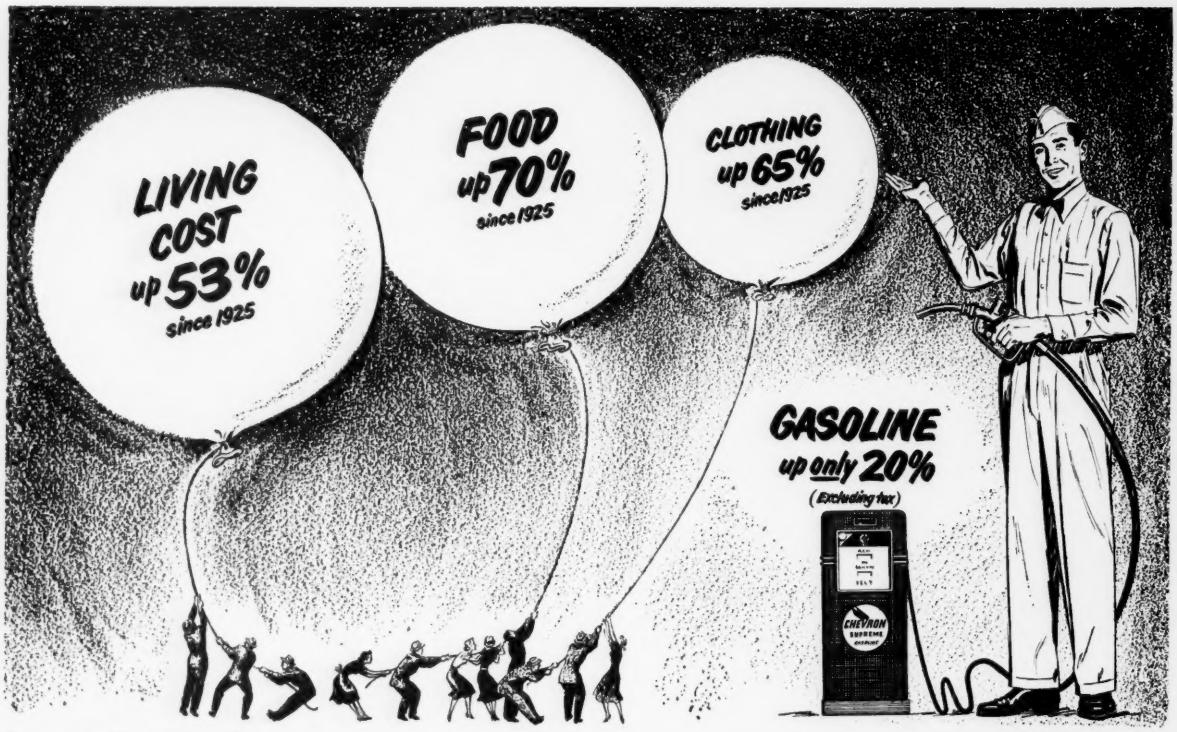


COMPETITION



Why gasoline is a real bargain today

Two facts lie behind the low price you pay for gasoline: oil companies work constantly through research to improve products and keep prices low, and they *compete intensely for your patronage.* That's why Standard opened the West's first petroleum research laboratory 32 years ago—and invests about $6 million annually in research.


LIVING COST up 53% since 1925
FOOD up 70% since 1925
CLOTHING up 65% since 1925
GASOLINE up only 20% (Excluding tax)
CHEVRON SUPREME

One result you see here. Thanks to competition, gasoline prices (aside from taxes) have risen only 20% since 1925 . . . less than half as much as practically anything else you buy. But there have been other benefits for you, too. Research, motivated by competition, has resulted in a steadily improving gasoline. Two gallons of modern gasoline do the work that required 3 in 1925, and this has paved the way for lighter, more efficient car engines that give you more power, performance and economy. Competition and research have led to better gas station service, as well, and to the world-wide search that has discovered the largest known oil reserves in America's history. Last year, Standard Oil Company of California invested $225 million in exploration, new oil wells, improved facilities to keep pace with competition. The result is better gasoline at prices which make it one of the real bargains in your family budget.

75 years of planning ahead to serve you better

STANDARD OIL COMPANY OF CALIFORNIA